

AUGUST 1978

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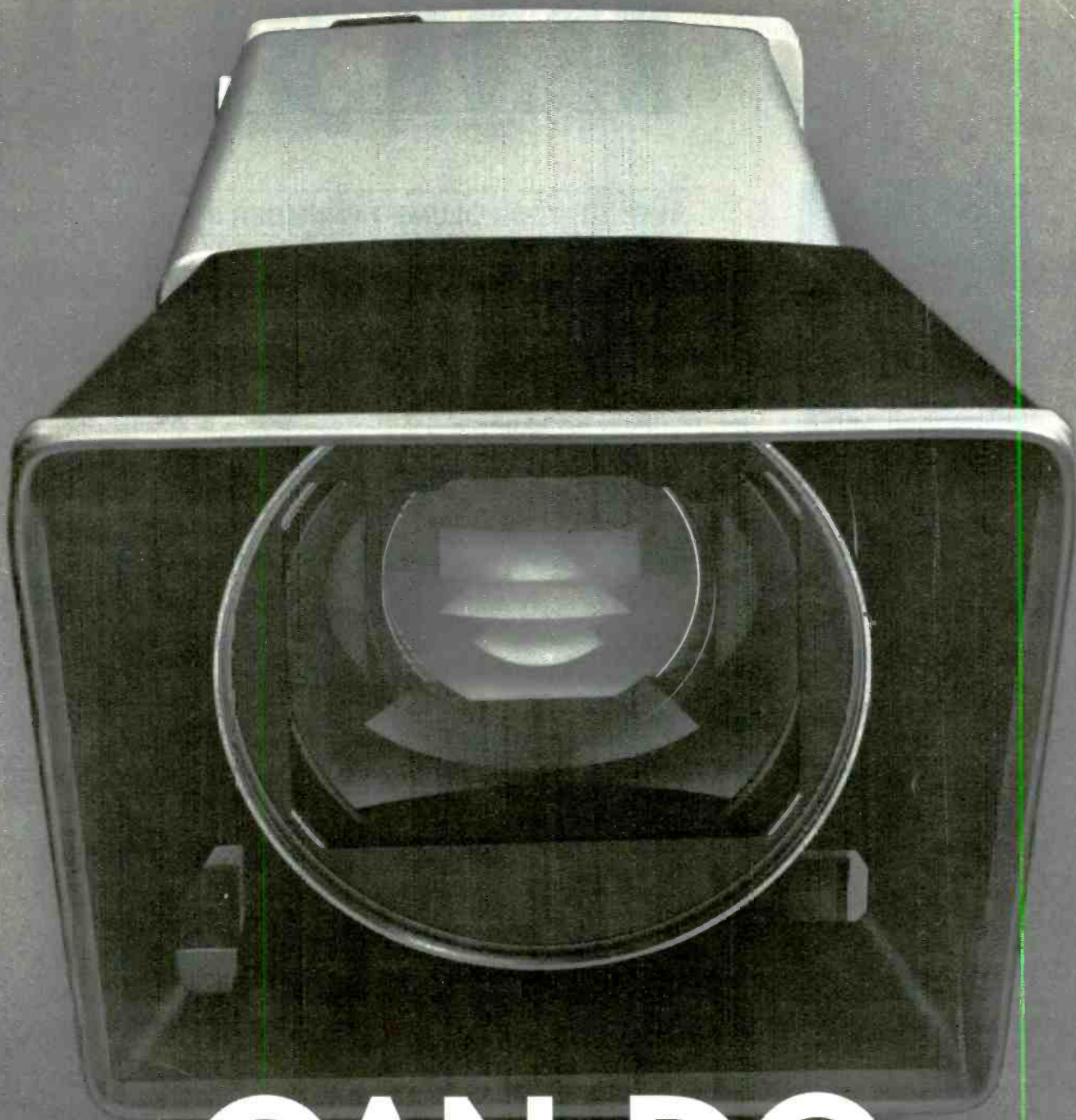
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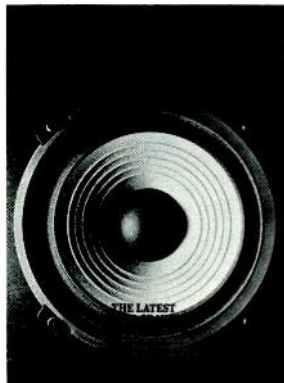
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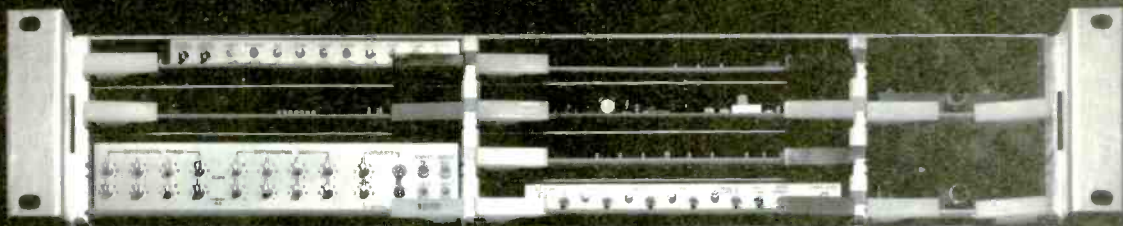
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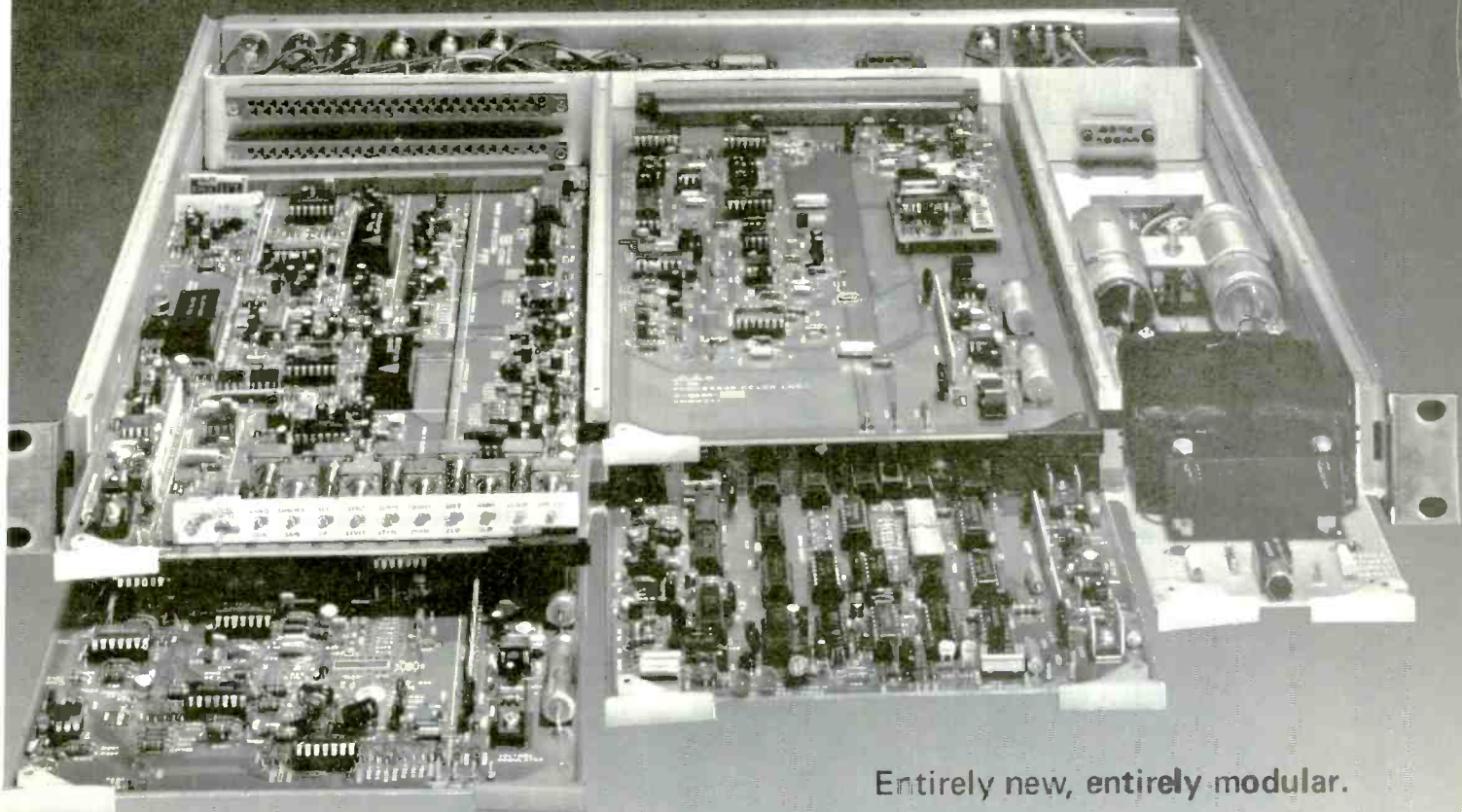
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# BROADCAST INDUSTRY NEWS

## '77 Net Revenues For TV Up: Profit Margins Off

An NAB survey of all TV stations indicated that time sales and net revenue were up significantly in 1977, but profit margins were off, most noticeably in larger markets. For the second year in a row, over 90 percent of all reporting stations showed a profit.

Nationwide, the typical TV station showed total sales of \$3,585,100 and net revenues of \$3,175,800, both representing 11.8 percent increases over the previous year. Network compensation was up 6.5 percent, national and

regional spots 9.7 percent, and local advertising 14.9 percent. Operating costs climbed 13.7 percent to \$2,366,000, and pre-tax profit margins slipped from 26.8 to 25.5 percent. Still, the typical station's before-taxes profit rose from \$760,900 in 1976 to \$809,800 last year.

Fulltime employment expanded to an all-time high of 67 for the typical station. Payroll costs, pushed up by wage increases, jumped 13.7 percent to \$899,100 in 1977. The past two years saw total operating expenses rise 25.2 percent, and payrolls 22.8 percent. It is estimated that 1978 will bring net revenues up another 10.2 percent.

## Court Says No To Press Ownership of Radio and TV

In a unanimous decision, the U.S. Supreme Court ruled that newspapers can no longer acquire radio and TV stations in their own communities, thereby affirming an FCC policy to promote diversity of viewpoint, and limit the concentration of economic power.

The court also said that, for the most part, existing combinations of newspaper and broadcasting outlets can continue. The exception here is in the 16 monopoly communities in which the only newspaper owns the only television station.  
continued on page 8

## New Developments From Dolby Labs

FM radio will benefit substantially if some new developments demonstrated by Dolby Laboratories at the summer CES in Chicago are ratified by the FCC and implemented in the industry, according to a Dolby spokesman.

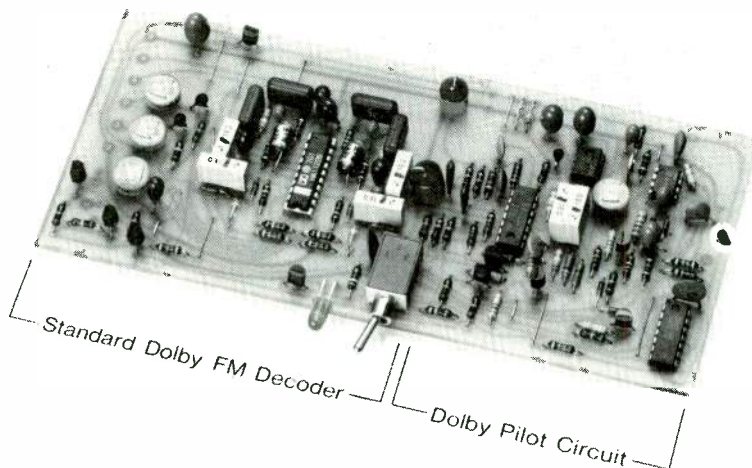
A new system of pilot identification tones was demonstrated which provides a means by which a variety of characteristics of an FM broadcast can be identified and used to automatically activate complementary FM receiver functions. Such broadcast formats as SQ, QS, Dolby FM, and so on could each be assigned a separate pilot identification tone frequency. These tones would be detected by special circuits in the FM receiver which would activate the proper complementary function to correctly reproduce the incoming signals.

In the case of the Dolby FM transmissions, the pilot identification tone would automatically switch in the Dolby decoding circuitry when an FM station using Dolby FM was tuned in. In addition, a light indicating that the Dolby decoder has been turned on would illuminate.

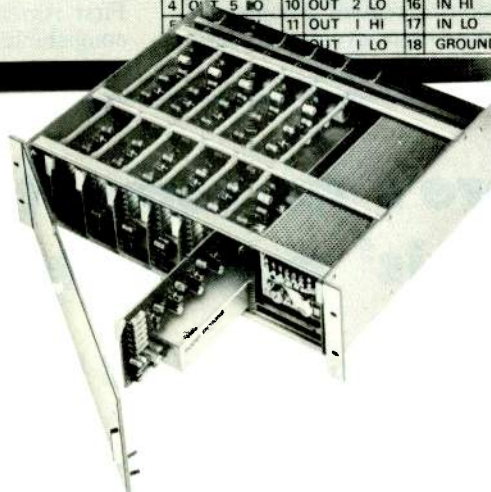
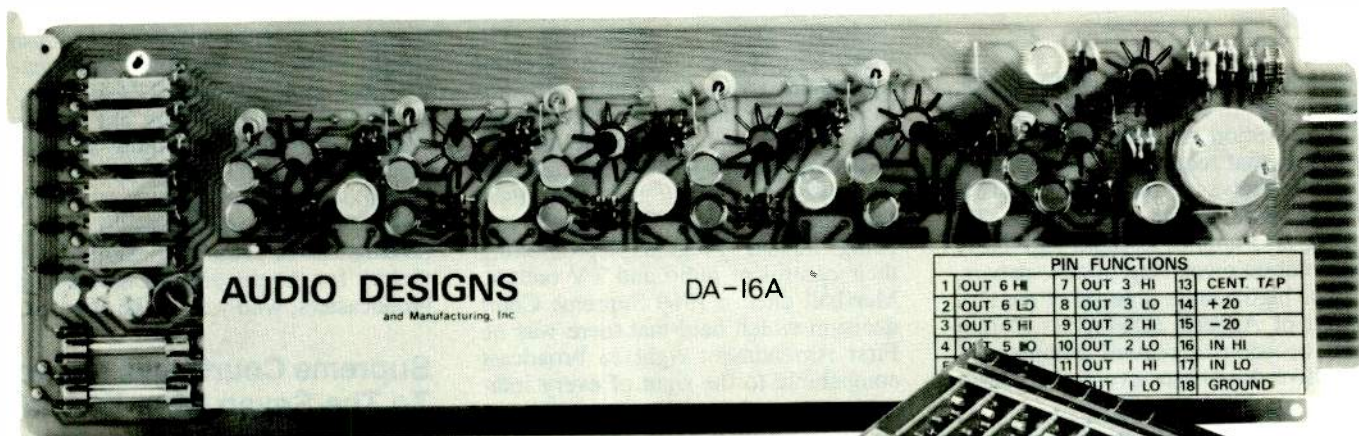
After realizing the need for an identification scheme, Dolby Labs proposed the tone system to the FCC and was given permission for experimental transmissions over FM stations in the Chicago and San Francisco areas. During CES, local Chicago stations that use Dolby FM (WXRT, WJKL, and WLOO) participated in these experimental demonstrations. Special FM receivers equipped with the Dolby pilot circuits and Dolby FM decoders were in daily use at McCormick Place, proving feasibility of the system.

San Francisco stations using Dolby FM are currently continuing with these FCC-sanctioned tests to gain further experience with this new service for FM radio. Full FCC approval is still required before general use of the pilot tone system can be implemented by FM stations using Dolby FM.

During an interview, Mr. Kevin Dauphinee, FM development manager, stated that stations obtaining maximum benefit from the Dolby FM process use minimum high frequency limiting, allowing complete program recoverability to the listener. The pilot identification tone would provide listeners' receivers with automatic switching to Dolby FM if they were appropriately equipped. Mr. Dauphinee considers the pilot identification tone as a convenience to listeners interested in receiving truly high fidelity FM transmissions. It is the belief of Dolby Laboratories that the convenience of a pilot identifications system which indicates Dolby FM stations will encourage both listeners and broadcasters to expect the highest performance available from FM broadcasting.



The pilot identification tone system uses inaudible signals in the 15 kHz region which are transmitted along with the FM radio signal around -80 dB relative to 100 percent modulation. The pilot tones do not interfere with normal programming as they are far below the threshold of perception for listeners



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## News

sion station or, if there is no TV station, the only radio station. The allowance of this exception reversed a lower court decision that required all papers to divest themselves of radio and television stations in their own communities. The ruling also applies to radio and television station ownership of newspapers.

The high court's reversal of the U.S. Court of Appeals (District of Columbia) decision to require complete retroactive divestiture avoided a consid-

erable shake-up in the communications industry around the country. The court's order would have affected newspaper/TV ownerships in 50 communities, and newspaper/radio ownership in more than 120 communities.

Justice Thurgood Marshall rejected the press's argument that their First Amendment right to free speech was being violated by regulation prohibiting their control of radio and TV outlets. Marshall cited a 1969 Supreme Court decision which held that there was no First Amendment right to broadcast comparable to the right of every indi-

vidual to speak, write, or publish. It was stated that the ruling in this case sought not to limit the flow of information, but rather to enhance the diversity of information heard by the public without ongoing government supervision of the content of speech.

Although the decision does require some divestiture of ownership, it may nonetheless be seen as somewhat of a victory for the majority of newspaper/broadcasters, who will not be affected.

### Supreme Court Says No-No To The Seven Dirty Words

The Supreme Court ruled, five to four, that the protection of free speech under the First Amendment does not bar the government from prohibiting radio broadcasting of words which are "patently offensive" but fall short of the Constitutional definition of obscene. This ruling reverses a U.S. Court of Appeals decision, and affirms the FCC's issuance of a declaratory order to WBAI-FM, N.Y. forbidding the broadcast of indecent language at times of the day when children were in the audience.

Associate Justice John Paul Stevens, in his majority opinion, wrote that the court was not ruling that the broadcast of an occasional expletive would justify action by the FCC against a radio station. Nor was it ruling whether the seven words might be acceptable for late-night, rather than daytime broadcast. "We simply hold," he said, "that when the commission finds that a pig has entered the parlor, the exercise of its regulatory power does not depend on proof that the pig is obscene."

Associate Justice William J. Brennan dissented, and accused the majority of "a depressing inability to appreciate that in our land of cultural pluralism, there are many who think, act, and talk differently from the members of this Court, and who do not share their fragile sensibilities."

Vincent T. Wasilewski, NAB president, commented that the decision was "a harsh blow to the freedom of expression of every person in this country."

### Vertical Interval Time Code: Information, Please

A working group on VITC has been organized to draft a SMPTE recommended practice defining information and coding methods to be used when recording VITC on videotape recorders. The major purposes of the VITC are to reduce the number of channels necessary to carry address information, and to allow the accurate reading of such information during slow motion and stop motion playback.

To maximize the usefulness of the  
continued on page 10

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## News

proposed code, the working group is calling for information on the channel capacity of tape recorder formats and associated TBC equipment presently being manufactured, or in widespread use.

Information supplied to the working group should include: TV lines available for recording VITC; video bandwidth; transient response; and any limitation due to slow motion or dubbing operations. Although not specifi-

cally defined at this time, the VITC signal is expected to be digital in nature, occurring on one or more TV lines within the presently unassigned portion of the vertical interval. Data will be field oriented and contain essentially the same information now included in the time control code as defined by ANSI C98.12.

The third meeting of the group will be held in Washington, D.C. during the second week of September. Replies, comments, or questions should be directed to the chairman of VITC Working Group, David K. Fibush, Ampex

Corp., Mail Stop 3-59, 401 Broadway, Redwood City, CA 94063.

## Big Three Spot Sales: \$500 Million In One Week

According to *Variety*, June 28, 1978, ABC-TV, CBS-TV and NBC-TV have sold more than \$500 million worth of spot sales for their 1978 to 1979 season. Bob Blackmore, vice president for sales of NBC-TV, said that prime-time prices are up about eight to 13 percent over last year, indicating that it is still a seller's market.

According to Blackmore, NBC alone wrote up more than 200 million dollars from June 21 to June 28. Major advertisers who made up front buys included General Foods, Lever Bros., Ralston Purina, McDonald's, and others. The same advertisers have also purchased prime time plans at CBS-TV. Blackmore said that advertisers waited to make their buys until after Fred Silverman took the wheel, and made his first schedule changes. ABC-TV's head of sales, Jim Shaw, indicated that their sales have been steady and that ABC is well over its competitors in sales because of its dominance in the web's ratings and demographics.

James Rosenfeld, president of CBS-TV, said that advertisers had held back until this time because there was uncertainty about how strong the market would be. Network spot and national spot business boomed in May and June, and the third quarter looked promising based on the volume of advance buys. Network sales heads then warned advertisers of the possibility of being shut out of good positions in the fourth quarter if they didn't make their up front buys. The strategy worked, and the scramble began, making for a very busy week.

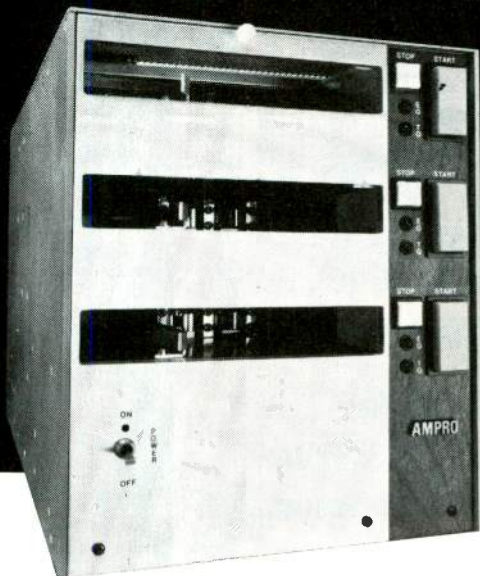
## Visual Communications Congress Meets In New York

Communications managers, audio-visual specialists, and others concerned with communication techniques and equipment met in June at the New York Hilton for the First Annual Video Communications Congress (VCC).

The Congress featured a number of seminars and conferences. The IFPA Film and Video Communicator's Conference, "Future Shock: AV's Impact on Business and Industry," included a session on video-conferencing. The ITVA (International Television Association) featured seminars and workshops on field production and media management and engineering dialogue. The International Tape Association held a conference on "International Video Networks" with panel members

continued on page 12

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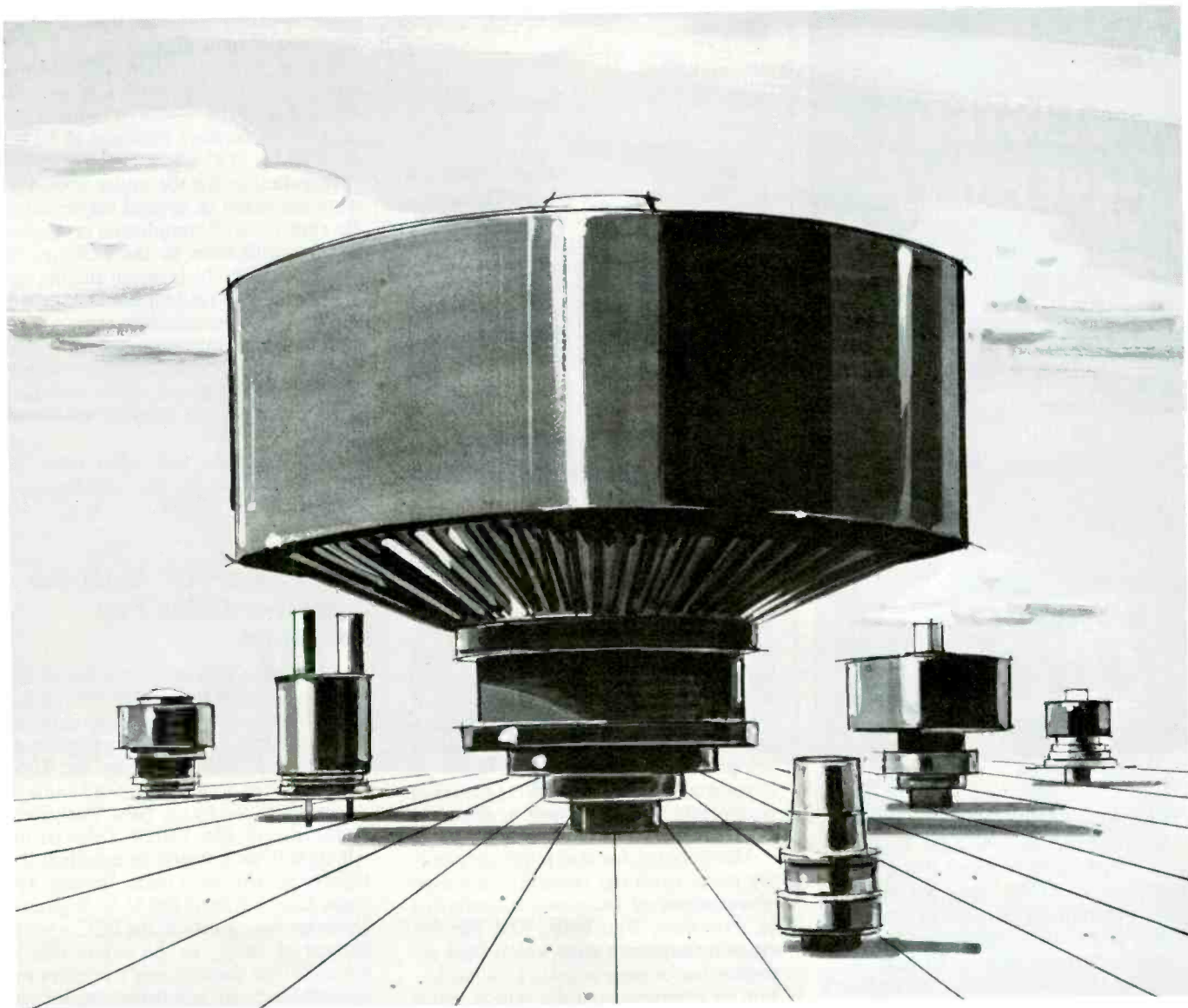


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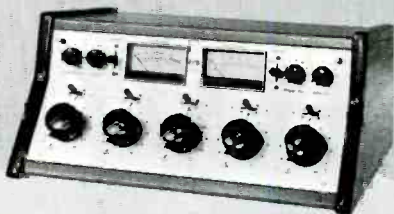
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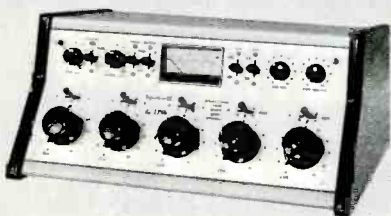
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## News

from Merrill Lynch Pierce Fenner & Smith, Eaton Corp., Holiday Inns, Coca Cola, and IBM.

In addition, there was an exposition of film, video, audiovisual, multi-image, and photographic equipment. Visual communications techniques were demonstrated in such areas as corporate communications, marketing and advertising, public relations, management development and training, meeting planning, education, and the arts and entertainment.

### FCC Adopts Temporary Policy Regarding Blanking Intervals

Until July 1, 1979, the FCC will issue advisory notices when horizontal blanking is detected in excess of 11.44  $\mu$ s up to 12  $\mu$ s, and when vertical blanking of 22 or 23 lines is detected. Horizontal blanking in excess of 12  $\mu$ s and vertical blanking in excess of 23 lines will be cause for issuance of a Notice of Violation. Regardless of this temporary policy, stations demonstrating a pattern of operation that exceeds the 11.44  $\mu$ s horizontal and 21 line vertical blanking parameters will be subject to more severe sanctions.

The impetus for this temporary policy came from the commission's own observations of increased occurrences of excessive blanking, and the increased frequency with which their attention has been directed to the distribution of program material which could not be broadcast in conformance with their blanking standards.

The FCC noted that, as their policies indicate, all licensees are required to have signal monitoring and measuring equipment to insure that the TV signal as transmitted complies with the commission's standards, and that each station licensee is solely responsible for the technical quality of the TV signal as transmitted. The commission stated that in making blanking interval measurements, the picture should be observed on a picture monitor to verify that the black edges are consistent with the scene content and not the result of improper equipment adjustment. It was also stated that the use of black or other colored borders, or reinserted video, solely to mask excessive horizontal or vertical blanking, is an unacceptable practice.

### "Small" Cable Expanded to 999 Subscribers By FCC

The definition of a "small" cable system, which operates under eased FCC

rules, was expanded to 999 or fewer subscribers in a change by the FCC effective June 12, 1978. The former upper limit for "small" systems was 499 subscribers. Systems with fewer than 50 subscribers continue to be not covered by FCC regulation.

Regulations for the under-1000 systems are eased in several major areas. No certificate of compliance is needed, just a notification to the FCC of the owner's name, the location and the signals carried. The technical standards apply, but measurements are not required. There is no requirement to keep files for public inspection. "Sports blackout" rules do not apply, and there is no limitation on carriage of distant signals.

Cable operators interested in the full story should ask the FCC for the decision in Docket 20561.

### Court Says FCC Must Set Rates For Cable Pay Programs

The FCC has won confirmation of the right to preempt state and local regulation of rates for cable programming when a charge is made per program or per channel. The ruling by the U.S. Court of Appeals for New York came in a case contested by the New York State Commission On Cable Television, which had been trying to establish the right to control such rates. But the Appeals Court quoted the U.S. Supreme Court on the legality of the FCC's jurisdiction of cable, to the extent this is related to the commission's primary responsibilities to television broadcasting. Joining the FCC against New York State in the case were a number of cable companies and cable organizations, including Teleprompter, Warner Cable, NCTA, Home Box Office and others.

### Correction

A few typographical errors occurred in Grant W. Bingeman's article, "Solving AM Bandwidth Problems," which was published in our June, 1978 issue.

In the footnote section on page 65, the equation should have read:

$$\text{rms THD} = \frac{\sqrt{H_2^2 + H_3^2 + \dots + H_n^2}}{\sqrt{H_1^2 + H_2^2 + \dots + H_n^2}}$$

The Smith Chart on page 68 should have shown the 990 kHz and 1010 kHz notations reversed. On page 78, the first paragraph should have read, "These equations assume that a lagging phase shift is indicated by a negative of  $\theta$ ." Also, footnote 13 on page 79 should have read Clifford H. Moulton.

## News Briefs

J. Robert Cole, vice president of CBS Owned FM Stations, says that **the growth of FM is on the upswing** and suggests that it might even surpass AM listening before 1980. Cole cites a recent analysis of Radar 17 Fall '77/ Spring '78 data, which shows FM's share of the nationwide radio audience at 46.4 percent (Monday to Sunday, total day, average quarter hour, persons 12 plus). Analysis two years ago showed the FM share at 39.6 percent. The study also shows that FM exceeds its AM counterpart in seven weekend dayparts and now approaches parity with AM in afternoon drivetime, 3:00 to 7:00 p.m., Monday to Sunday, when FM attracts 49.2 percent of the radio audience . . . . Newstime, United Press International's **around-the-clock voice and news photo service** for cable systems, began delivery July 3, by domestic satellite, to an initial circulation of over 150,000 homes. Using a slow scan process, Newstime transmits UPI stills to accompany audio reports in continuous 15 minute segments updated five times in each 24 hour period.

**WXRT-FM, Chicago, is broadcasting in Dolby.** Station engineer Ken Rasek stated, "Most radio stations severely limit the high frequencies and dynamic range of their signal to make them stand out on the dial. With Dolby, that's not necessary." Although listeners should have Dolby-equipped receivers to gain full advantage, all FM listeners can benefit from the improved sound.

**Relocation of New York City TV stations' antennas** to the World Trade Center is closer to reality, as the first sections of the multistation tower were shipped from the RCA Broadcast System's facility in Gibbsboro, N.J. The antenna structure is to rise 351.5 feet above the Center's north tower, and will weigh 363 tons. It will be a self-supporting mast **accommodating 10 TV stations and up to 15 FM radio stations**, and will be the largest single-stack antenna array ever designed by RCA. The completed mast will have a value of seven million dollars.

**Ampex has loaned four audio recording machines** to the Aspen Music Festival. A new program, the Aspen Recording Institute, will give 56 student recording engineers the opportunity to obtain practical experience recording live performances that range in complexity from a soloist to a 100-voice choir. The machines loaned are three ATR-102 audio recorder/reproducers and an ATR-700 recorder. They will be used in two-week seminar/workshop sessions, four of

continued on page 16

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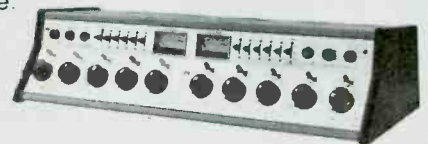
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NV-A950 will execute frame-by-frame insert and assembly edits, automatically. There's a five-minute memory for entry and exit points of video and audio inserts. And for quick and precise location of the exact edit points, the NV-A950 also has controls for fast play (double speed), search (one-fifth speed), slow rewind and pause. There's also a rehearsal mode that lets you run through an edit before you actually perform one.

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In Canada, contact Panasonic Video Systems Department, 40 Rosslyn Drive, Rexdale, Ontario M9W 1B5.

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## News Briefs

which are to be held for 14 students each, from July 10 to August 20.

**CEEFAX, a new publication** which outlines the history of the British teletext system, is now available. It is intended for readers familiar with the technicalities of the system. The cost is \$35. Contact A.M. Daniell, BBC, Broadcasting House, London, England, W1A 1AA, Telex: 22182.

**Nominations are being sought** by Freedoms Foundation for consideration

in its national awards program. Nominated material must have been created after October 1, 1977, and must be submitted by October 1, 1977, and must be submitted by October 1, 1978. For details, contact the Awards Administration, Freedoms Foundation, Valley Forge, Penn. 19481.

**Media Means Producers**, Farmington, Conn. shot a local TV commercial at 9:00 a.m. and had it on the air at 5:00 p.m. that same day. They used an Ikegami HL-77, and extensive pre-planning enabled them to accomplish the task in the short time.

## Business Briefs

**NEC Ltd. will pay \$8.5 million** for Electronic Arrays, marking the first such Japanese foothold in this country for production of high density memories and related LSI products. The deal is subject to approvals from Array's shareholders and the Japanese government.

**Corning Glass Works** has sold its fiber optics line to Welch Allyn's Industrial Products Division, Skaneateles Falls, N.Y. The sale included the inventory, customer list, and associated manufacturing equipment . . . **Tektronix, Inc., has formed a Brazilian subsidiary** to handle their sales and service in that country, with plans to make it the base of their South American operations.

**Adams-Russell Co., Waltham Ma., will pay more than one million dollars for Mt. Kisco Communications**, which has about 2,000 basic subscribers and 1,500 Home Box Office users . . .

**Cox Cable Communications, Atlanta**, announced its acquisition of University City Television Cable Co., Inc., University City, Fla. More than \$8 million was paid for the system, which serves about 26,000 customers . . .

**KPRC-TV, Houston, has purchased 12 Ikegami HL-77A** self-contained portable color cameras . . . **Syracuse Cablesystems**, subsidiary of Canadian Cablesystems Ltd., was awarded a franchise to construct a 380-mile, two-way cable system in Syracuse, N.Y. A **Jerrold Electronics Starline 300** broadband communications system will be used.

**A-T-O Communications, Inc., has agreed to purchase WILX-TV, Channel 10, Onandaga, Mich.,** from Television Corporation of Michigan, Inc. The NBC affiliate will change hands for about \$12 million upon approval by the FCC . . . **Florida Public Broadcasting is expanding** its videotape capabilities with the purchase of five RCA TH-100 one-inch VTRs . . . **Autocue Products, Ltd.,** of London, England, has named **Listec Television Equipment Corp.** as the exclusive distributor of their Digivision Monitor Prompting Systems in the U.S.

Due to an increase in demand for editing time, **Reeves Teletape, N.Y., has added another editing room.** The new facility features the latest CDL switcher, computer command for up to four VTRs, two title stands, and a Neve audio console with equalization.

**Exar Integrated Systems, Inc. has signed Innovative Marketing,** Denver, to handle their complete line of ICs in Colorado, Montana, Utah, and Wyoming. **Rep, Inc.** will handle the company's wares in Alabama, Georgia, Tennessee, and Mississippi.

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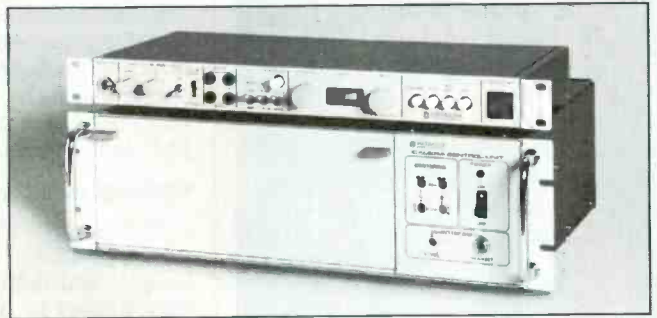
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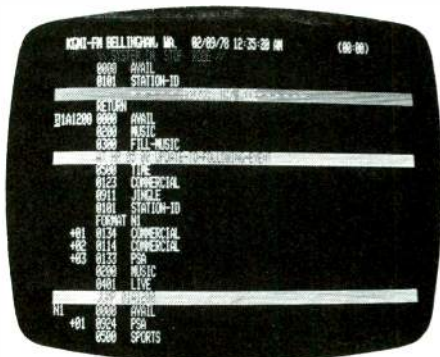
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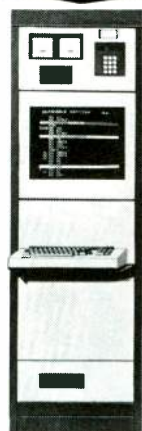




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# RADIO

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## Lessons From Two Kinds Of Radio Success

MAKING A GO OF IT with a commercial FM station in one of the most crowded big-city markets takes different programming from that needed to win broad acceptance for a new public station in a medium-sized market. But there are some instructive common factors. So this month we take a brief look at WLUP, refurbished about a year ago on the intensely crowded Chicago air waves; and then at KWIT, a new public FM station in Sioux City, Iowa.

### Winning with the "Loop Troop"

The young, enterprising management of WLUP, "Chicago's brand new Loop," had definite ideas about how they wanted to realign the station: to provide a "broad-appeal album rock," which would reach strongly throughout the 18 to 34 demographic group, attracting women as well as men.

Terry Chess, general manager, explained to *BM/E* that the general plan was to make the presentation of the music direct, sincere, and "real," in line with the developing tastes of the young adult group, widely believed to be more "mature" than in earlier years.

This plan is carried out successfully by a corps of disc jockeys, "The Loop Troop," who by temperament and training operate "one-on-one" with the listener. Each one invites the listener to join in enjoying music that he (the jockey) treats as a personal choice. There is no "hype," but rather a personal and knowledgeable enthusiasm.

Beyond that, a large effort is made to get the listener into feeling that she or he is part of the station "family." The morning information — traffic, weather, local news, etc. — is given in an informal style. Also early in the morning is a phone call in the station's "day-off service." Listeners are invited to send in post cards if they would like a day off from their jobs. The station then checks with employers. If a date can be cleared with an employer, the station calls the employee early in the morning to say, "Go back to sleep! You have the day off." This is the first notice the employee gets that his or her request has been granted. It's all on the air, and the employer thus gets a plug.

Another audience-involving plan is the Program Advisory Board. This is a

group of 12 listeners chosen anew each month from contest entrants (more on contests below). The Board is invited to the station to sit down with station management and criticize the operation, no holds barred. This helps the station, says Chess, by pinpointing audience reactions, both positive and negative, as well as by alerting all listeners to the fact that the station listens to *them*.

The station has developed a barter operation with numerous entertainment spots in the city. "The Loop's Cheap Date Series" consists of arrangements under which, at each spot on a certain night, the admission fee is reduced to 98¢. Among these "WLUP Specials" are the "98¢ Shoe Shake," at a popular discotheque; the "98¢ Concert," at a jazz joint; and the "98¢ Midnight Movie," at a movie house showing top featured films. There are a number of other regular 98¢ specials. Each one gets billed as "courtesy of WLUP," and the entertainment spot gets some time on the air. And listeners have another reason for feeling well served.

The station runs a number of contests, but Terry Chess is emphatic that there is "no hype, no hassle." No contest aims for audience hysteria, but rather for strong, serious involvement. Chess says the responsible young adults the station wants would be driven away by steamed-up contests. Solid prizes are given, but in a low-key manner. For example, one operation offered each of those who qualified a "\$1000 loan that you don't have to pay back." The response has been spectacular.

The station puts on a number of "service" programs. One is "The Loop's Urban Survival Tips," hints on coping with life in the big city, on the air along with the music every day from 2:00 to 6:00 a.m. The "Loop Line" is a 24-hour-a-day hot line for listeners with questions on what to do, what's coming up in Chicago. "Your Rights in Chicago" is a discussion of city government issues, one hour twice a week. There have been interviews with high officers in the police department on smoothing race relations in Chicago.

Another kind of service to listeners is a once-a-week preview of new record releases in the album-rock category. Chess says this lets listeners decide

what new releases they like before they go out to buy. "The Chicago Special" is a four-hour live program, produced by the station once a month, airing rock performers and groups from all over the city. It is tremendously popular with the station's young listeners.

That sampling of WLUP should give a sense of what the operation is all about. How is it working out? The last Arbitron put the station sixth and seventh in the city in the most significant demographics, with nearly equal pull for men and women. That is success for a moderately-scaled independent FM station in the second-largest city. "We have about as much business as we can handle," reports Terry Chess. With program ingenuity of the kind they are demonstrating, Chess and his associates deserve their win.

#### How they built a public station in Siouxland

A group of public-spirited citizens in Sioux City, Iowa started talking about it early in 1975, and by the middle of that year organized a feasibility study: was there a demand for a public radio station in the city? Would it be supported throughout western Iowa? They put these questions to business leaders, school and government officials, civic leaders, and representatives of the media, ethnic minorities, and labor and cultural organizations in a 100-mile radius of Sioux City in Iowa and the neighboring states.

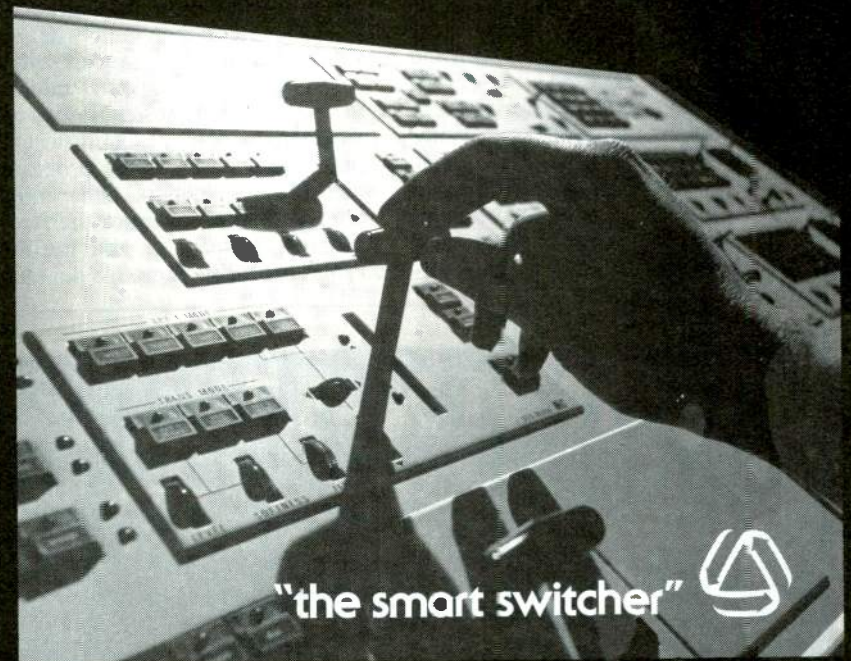
The response was strongly in favor, so a decision was made to locate the station at Western Iowa Tech Community College, which as a public institution could logically handle public funds for construction and operation. In early 1976 the station got a construction grant of \$180,000 from the Department of Health, Education and Welfare, and a matching grant of \$60,000 from the Iowa state legislature. The CP came from the FCC for the new station, to be known as KWIT.

The plan was for a stereo FM plant with 100 kW of ERP, in a new building designed for it. Total cost was budgeted at about \$500,000, with contributions not only from HEW and the Iowa legislature but also from the Corporation for Public Broadcasting. Annual operating costs were to be funded by the state legislature, which supports several other public stations in the state, and by CPB.

The whole program went forward without major difficulty. KWIT got on the air in January, 1978, with the studios in temporary quarters at Western Iowa Tech while the new building was being finished. But raising construction money and getting a new plant on the air are obviously just the beginnings of "success" for a public radio

continued on page 20

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## Radio Programming

station. The management must make the station into a welcome, even essential factor in community life.

Robert W. Thomas, director of broadcasting at Western Iowa Tech and general manager of KWIT, discussed with *BM/E* his philosophy for the station. He sees his main roles as serving important minority groups and tastes that are not served by commercial radio; providing encouragement and lines of communication for every kind of worthy charitable, artistic, and edu-

cational activity in the community; and bringing in arts programs of major quality from other cities and national sources. He says the station is not competitive with local commercial broadcasters, but complementary. He believes it will enlarge radio listening as a whole, making more for everybody.

Among the unserved "minorities" the station addresses are lovers of classical music, opera, folk music and jazz. Substantial parts of the programming are for these listeners. Other minorities who get special attention are American Indians, Hispanics, and the elderly. Programs for such groups not only pro-

vide important information and guidance, but also allow members to express themselves. A senior citizens group, for example, has put on several musical programs.

KWIT can give more time to news and public affairs programs than can a commercial station, Thomas points out. Farm information is particularly important; there are daily reports on prices, weather, etc., with frequent discussions of farm topics.

Altogether, about 73 percent of the programming is produced in Sioux City or nearby. The remaining 27 percent comes from National Public Radio and from syndication by other public stations around the country. KWIT qualifies for the NPR programming by maintaining the levels of staff and equipment that NPR specifies for members. Among the NPR requirements is a professional staff of at least nine persons.

The syndicated programs bring in, for example, great orchestras from around the country, such as the Chicago Symphony and New York Philharmonic. NPR supplies outstanding recitals, discussions, and educational programs.

Beyond all that, Thomas and his associates mount a continuing effort to make the station responsive to every section of the community. The "Friends of 90.3" (the station's carrier frequency) are local citizens who subscribe to become "members" of the station, thus helping with money and with advice and community feedback. The station regularly surveys all communities in the area for arts, educational, and cultural activities. These are given notice in the station's monthly publication, the "Siouxland Arts Guide," and when appropriate, get air time. Volunteers and students report from each community. This aids the community by raising "arts consciousness," and by letting people everywhere know what their neighbors are doing.

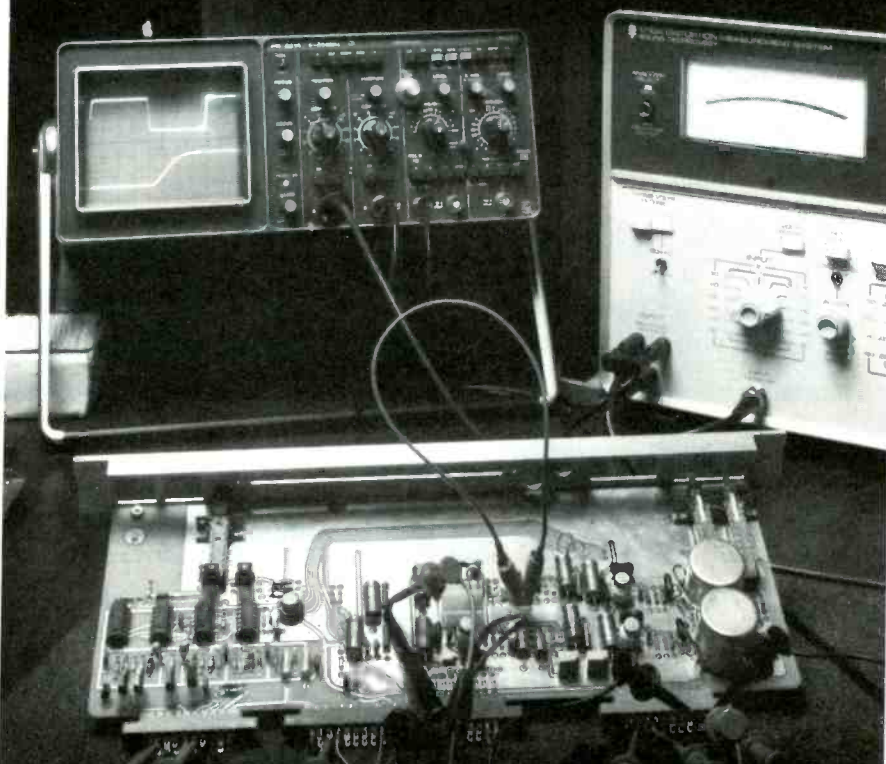
Major cultural activities in Sioux City itself naturally get strong support. The Sioux City Symphony, for example, is put on the air regularly.

How is it working out? KWIT has been on the air for just half a year, but the mail and telephone response has convinced the management that they are on the right track. Although no detailed audience surveys have been made so far, the many-sided effort to involve the community in the station seems certain to keep building acceptance.

Listener involvement is naturally the common factor in success for WLUP and KWIT, as it is for any radio station. The two stations use different ways to get that involvement, but both ways have lessons that many radio managements can benefit from. **BM/E**

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ONE EARMARK OF WORTH in the syndication business is survival for a comfortable number of years, and nearly all the syndicators covered in this series have carried that emblem of success. To win it a syndicator needs, among other virtues, an excellent taste in popular music and long experience in dealing personally with the day-to-day, month-to-month programming problems of radio stations.

Studio West, founded in 1973, boasts a constituency of about 35 stations, most of them in the smaller markets. Founder and president Jim Meeker has supplied the experience in station program operation, along with a considerable part of the skill with popular music. He came to syndication after some 20 years as a disc jockey and program director of various stations, mostly in the Los Angeles area.

Meeker told *BM/E* that somewhere along the line he developed a special empathy for the operator of a station in a small to medium market, who does not have the resources to put on a rich and polished program performance. He became convinced that syndication, plus a reasonable amount of automation, was the formula for a winning performance, a "big station quality," in such situations. Meeker himself had made his mark as an expert in the Top 40 field. He assembled a team, now totalling eight people, which included specialists in other areas of popular music.

That Meeker has put to work all his experience and skills, and those of his associates, is clear from the continued growth of Studio West. Like most top-level syndicators, the Studio West team works very closely with each station's management to get the right mix of material for the market, the competition, and the management's hopes and desires. The sensitivity of the Studio West staff to station needs can be seen in the fact that no two stations on the list get exactly the same program mix. Studio West makes detailed but optional recommendations to the management. If management goes along, even in part,

Studio West will work closely with them in planning the full operation, monitoring performance from time to time and helping with advice on getting rid of faults that develop.

The formats now offered are beautiful music, MOR, top 40, top adult, oldies, and country (either traditional or modern). Whatever the format, though, today's listeners want a contemporary sound, says Meeker (see, "Which Way the Radio Listener?" in *BM/E*, May 1978). Thus, the traditional MOR music still basic in most small markets must be "modernized" for many competitive situations. Studio West has done this successfully for a number of clients. Keeping up with these trends in musical taste is another essential of good syndication. Unless the syndicator moves with the listening public, Meeker explains, he will begin to lose strength in the markets he serves.

An important element of the Studio West operation is the flexible voice tracking Meeker and his associates are prepared to supply. The team will develop voice track concepts for the station, and then, if the station wishes, record a supply of voice tracks to be used with the music. The objective of the voice tracks is to make the programming sound "live," as though it belongs particularly to that station. This has been highly successful in a considerable number of locations.

The minimum monthly fee is \$350, which includes the complete programming, plus jingles, market consultation, operations advice, etc. Supplied initially are 60 to 80 10½-inch reels, with six to eight new reels a month. Studio West has its own mastering and duplicating studio, using eight MCI tape machines. All dubbing is done one to one, at playing speed. Like other successful syndicators, Meeker says that top-most technical quality is essential to his operation. The consultation supplied each client includes a survey of audio and transmitter equipment, with recommendations for possible improvements or replacements of equipment, and advice on operation and maintenance to preserve the best technical quality.

In sum, Studio West is winning with battle-tested programming experience and emphasis on the specific problems of the small and medium markets.

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**6. Cue Control.** The BVE-500A features built-in cue record and erase. This 1kHz tone is recorded on Audio 1, and is useful for both auto control systems and pre-cueing the tape to air.

These are just a few of the new BVE-500A features.

Others include auto shut-off, external interface of control logic, manual edit capability, and more. You can see them all in action when you ask for a demonstration of this versatile new editing control unit. To do that, just contact your nearest Sony Broadcast office.

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# TELEVISION

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## WBTV: A Measure of Commitment From A Strong Management

WBTV, CHARLOTTE, NORTH CAROLINA. Its roots in the community extend some twenty-eight years into the history of its city of license. Its sister AM station goes back even farther — some 50 years of broadcasting. The newest offshoot of this Jefferson Pilot Broadcasting enterprise is its FM station. Charlotte is a good broadcasting market, and the broadcasters at WBTV strive to be good to it. As John Edgerton, vice president and managing director, puts it, local programming and community affairs are just a couple of ways that WBTV tries "to return to the community some of what we take out of it."

The market they serve is somewhat unusual. The ADI encompasses some 22 counties in two states, North and South Carolina, and better than 50 percent of its audience resides outside of metropolitan Charlotte. With little industry of its own, Charlotte tends to be largely white collar and supports a lively cultural community. Its surroundings are industrial, consisting of a large textile industry, and beyond the urban ring the agricultural South is still strong. Though the policy of station



*WBTV devotes one full 18-hour broadcast day each August to a charity auction to raise funds for Boys' Town*

commitment to the community can be traced back to its founder, broadcasting pioneer Charles Crutchfield, implementation of it has received only a recent boost from new technology. John Hutchinson, programming manager for WBTV, said that the new technologies of electronic field production equipment and microwave have "revitalized local programming . . . and have marked a return to 'reality' television with an excitement not seen since the live television days."

Technology, though an integral part of what WBTV has accomplished, is only a small portion of the total mix. Edgerton rates the station's ability to attract and hold creative talent as one of the major achievements of the station. Bob Taylor, sports reporter, whose program, "Diamonds Are Not Forever," won an Iris Award from the NATPE this year, rates instead, management's willingness to support new ideas as one of the most important ingredients. After long discussions with a number of WBTV personnel, it is clear that both Edgerton and Taylor are right. The receptiveness and responsiveness of management have helped to produce a creative environment at WBTV where, as one station employee put it, "There's a sense that if you have a good idea, management will let you run with it."

Edgerton figures that about 15 percent of WBTV's program schedule is locally originated, and Hutchinson adds that many of these programs enjoy shares of audience in the 40s and 50s.

As a result, the local programming is frequently a strong point in the station's sales with many clients demanding local program spots not only for the numbers but also for the status the programming lends to their appeal. Central to the organizational strength of WBTV's local programming effort is the Creative Services Department, managed by Mark de Castrique. This department employs some 12 writer-producer-directors. In addition, there are two full-time photographers and other support personnel. The department is responsible for producing local, non-news programming as well as serving the station's clients in the production of commercials. De Castrique says that the mix between commercial production and local production in the areas of entertainment, community affairs, and children's programming is a big factor in keeping Creative Services creative.

### Planning and organization are big factors

Though the organization chart may appear straightforward with programming superior to Creative Services and Community Affairs and a separate line for News, there is a tremendous amount of interchange among the various groups. This interchange is promoted by regular "seminars" in which the various personnel get together to formulate policy and present ideas.

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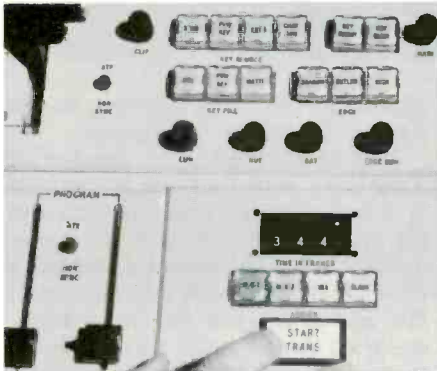
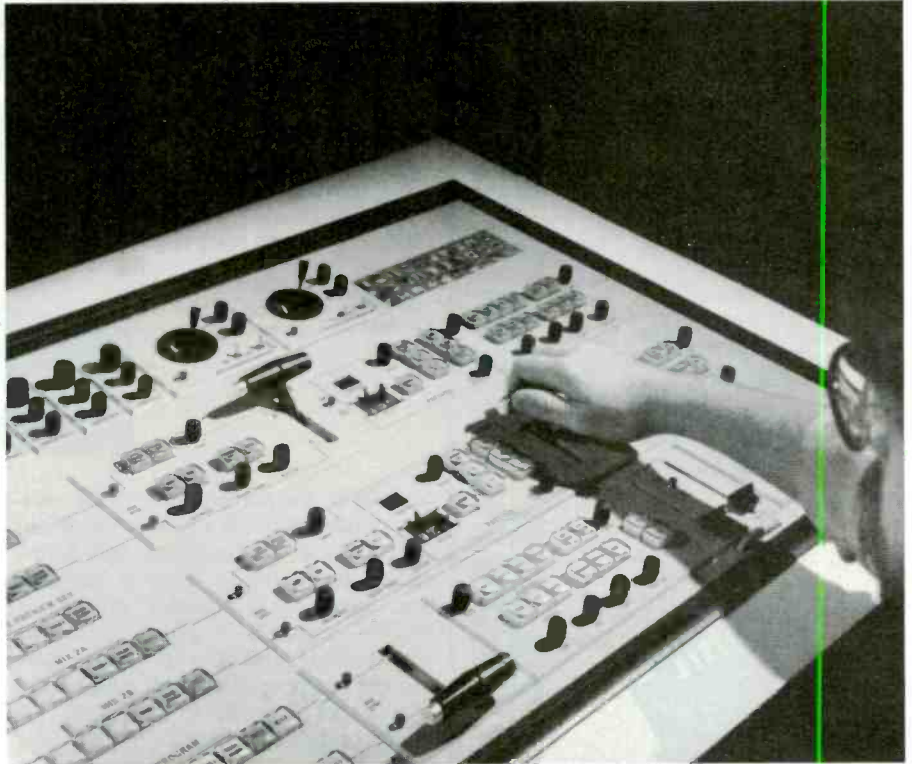
*John Edgerton (right), vice president and managing director of WBTV, checks over spot inventory*



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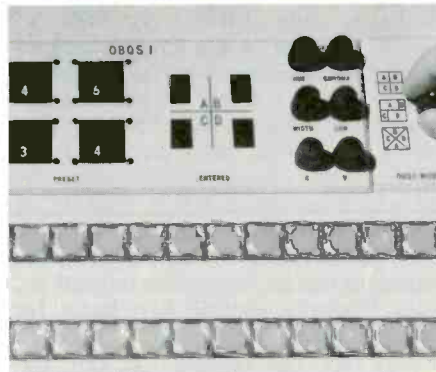
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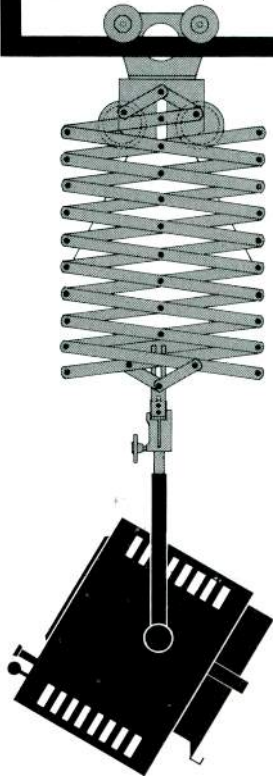
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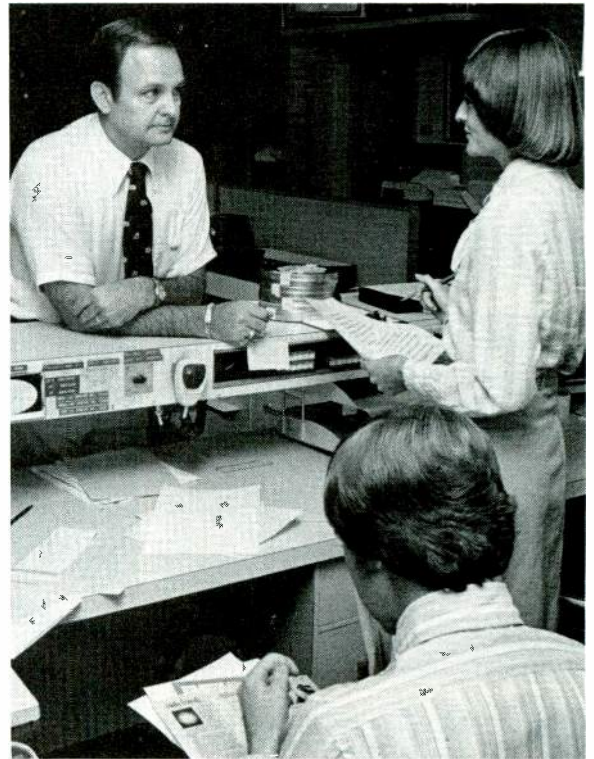
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## TV Programming



*Bill Ballard (left), news and information manager for WBTV, heads a department that produces as many as 25 sports and news specials annually in addition to regular newscasts*

Moreover, the performance of the various departments is open to criticism during these get-togethers and fortunately, the criticism tends to be positive. The formal planning process at WBTV begins with a spring seminar where management, supervisory personnel, and people from all ranks at the station get together to formulate, or rather update, the station's five year plan. At these sessions discussions are held about what subjects the station can deal with and the areas that the station ought to get into. A general outline is formed, and then in the fall the plan is refined into an annual operating plan at another meeting. At this time specifics are discussed and decisions are reached on how various subjects will be presented and treated. After decisions about which department will have responsibility for which projects, the personnel retire to plot out the details of the individual projects.

It is at these meetings that particulars of the budgets are discussed; but Bill Ballard, news director for WBTV, points out that in the four-and-a-half years that he's been with the station he cannot recall a single project that has been scuttled for reasons of budget. The news department alone produces between 15 and 25 specials per year, each of which are either a half hour or an hour long. Built into this plan is a degree of flexibility so that the news department can be responsive to local issues. Recently, specials have had to be created almost "instantly" to cover topics like The Wilmington Ten, the

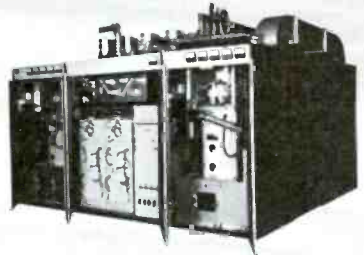
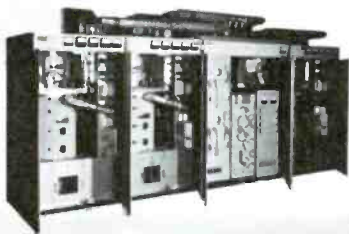
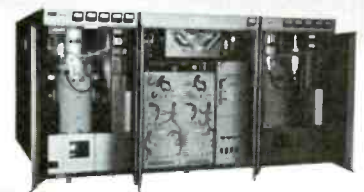
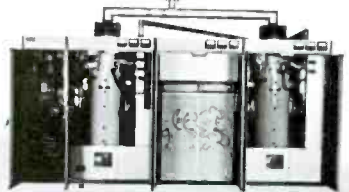
Liquor By The Drink Decision, and an Airport Bond Issue Referendum.

The news department consists of some forty personnel and is equipped with both film and video. Ballard says that his department is now relying on tape for about 60 percent of his news production and expects this to increase. The station also has four microwave-equipped remote units, three assigned to news, and the other to Creative Services.

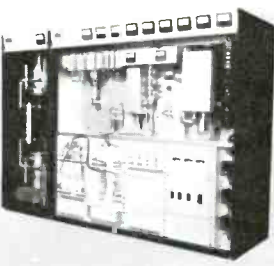
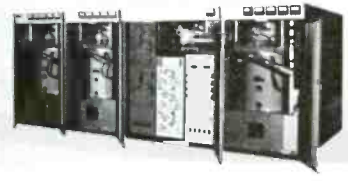
The importance of Creative Services cannot be overstressed. As Mark de Castrique has indicated, the department is closely allied with the sales division for the production of commercials for Charlotte area clients. These commercials are produced both for airing on WBTV and for regional spots on other stations. Both of WBTV's studios tend to be booked solid for commercial production, which amounts to about 60 percent of studio time, and for production of local programming. In addition, much of this local production is provoked by an active community affairs department staffed by Lew Heckler, its manager, and Clare Lowry. Moreover, Creative Services also provides producers, directors, and writers to other departments when required.

De Castrique and other members of the station who spoke of the role that Creative Services plays give most of the credit to Pat Lee, the visionary of the department who founded it in 1971. Lee had an idea that she pursued relentlessly, that local programming

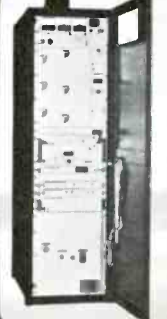
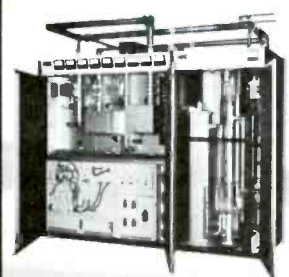
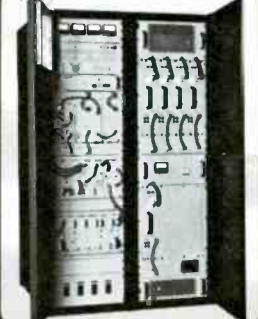
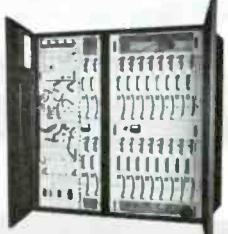
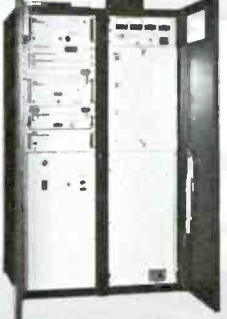
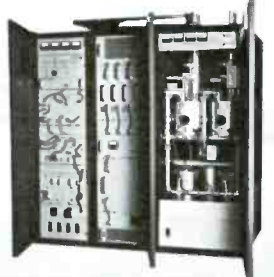
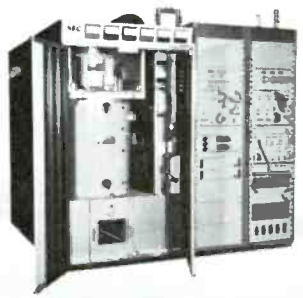
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## TV Programming

could be top quality and the keystone of a station's identity. Lee developed many of the department's procedures and sparked an air of creativity that continues. There is an apparent dedication to preserving and extending the philosophy of Pat Lee, who succumbed to cancer this past year.

### Providing an outlet for creativity

If there is a programming strategy that has been exploited to its fullest at

WBTV, it is the use of the magazine format. The format is used on its 6 a.m. morning show that is an amalgam of farm news, weather, often a public affairs discussion, a syndicated feature, "The Butcher," and a live remote from the surrounding areas. At noon an hour-long magazine format show which features news, weather, call-in segments, live remotes, and discussions holds a strong ratings position. The show, "Top Of The Day," also provides an opportunity to try out new ideas. Program manager Hutchinson describes the magazine format as an

opportunity to use known quantities to support new ideas by slinging an untested feature between two well-known and popular features. This tactic, which WBTV calls a "hammock," is also extended to the community affairs program aired at 6:30 Sunday evenings. Here, the Community Affairs Department puts together a program dealing with what John Edgerton describes as subjects on the "human condition." Slung between "WBTV News" and CBS's "60 Minutes," programs on education, health, nutrition, drug abuse, and other such matters are assured a strong audience.

Another hit product of the Creative Services Department is "Whistle Stop," produced by Clare Lowry of the Community Affairs department. This show is one that has benefited greatly from the new EFP capabilities. The show, which airs daily for a half hour, is intended for children and is produced entirely on location. Trips to a gold mine, zoo, or other attractions often provide the setting for "Whistle Stop."

Another benefit of the magazine format is that Community Affairs can often produce a segment for "Top Of The Day," or the morning program, that will treat important local issues. These segments often come out of issues that for one reason or another cannot be accommodated by their own specials. Community Affairs also writes and produces numerous PSAs and has no problem, according to Heckler, fulfilling its 100 PSA per week commitment.

The use of the magazine format is expanding at WBTV. This year the news department is producing a half-hour magazine program called "Special Edition of WBTV News." Three programs have aired thus far and reaction seems to be good. The programs have dealt with an unsolved mass murder, an investigation of a Charlotte program to treat black alcoholics, and profiles of Dean Smith of the University of North Carolina and a 103-year-old black woman.

Programs are also not allowed to swing slowly in the wind. If there is a way to support one program within the context of another it is done. One very popular program, "Carolina Camera," is used as a five-minute feature twice weekly on the evening news and once a month as its own half-hour special.

It is one thing for a station to make resources available to a local programming effort and quite another for local programming to be a resource in itself. The quality of WBTV programs is the highest possible. The two which won Iris Awards this year are prime examples. "Diamonds Are Not Forever" was a highly personal insight into the mind and feelings of Bob

continued on page 34

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## TV Programming

Taylor, who had played professional minor league baseball and then looked back on it and wondered if things could have been different. The program, which increases its audience with each airing, focuses on what it's like to be a minor league player without the glory and without the paycheck of the major league stars. Taylor wrote, produced, and was featured in the program. He approached the local Charlotte minor

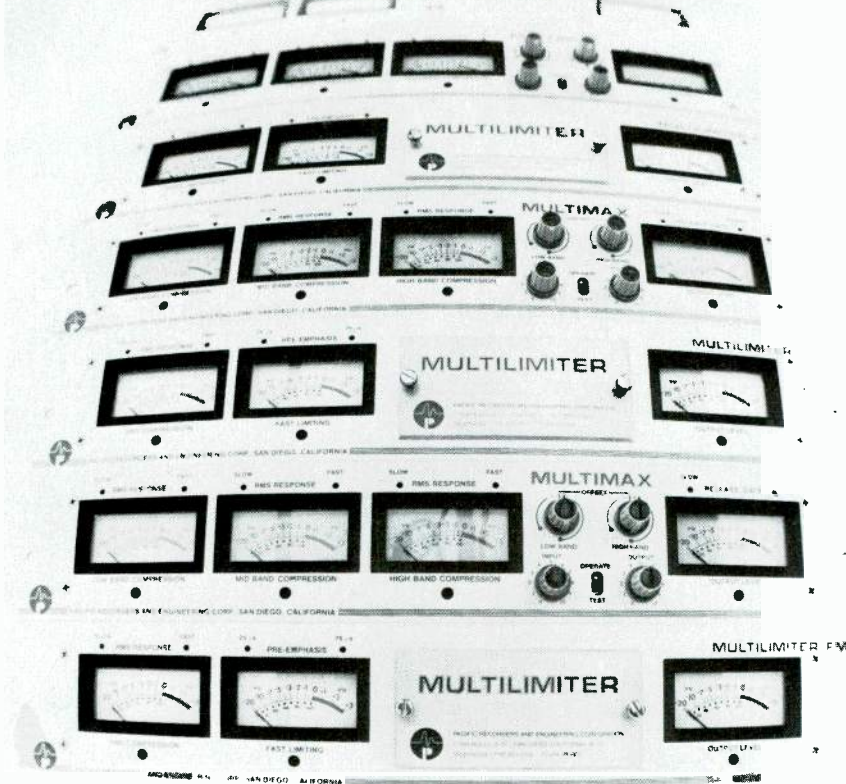
league team with the idea of doing a two-part story. The first part would involve the theme of what it's like to play minor league ball, and the second part would focus on Taylor's brief return to the playing field. Late in the season when the pennant race could no longer be affected, Taylor played one game. As it turned out, "it couldn't have been better if I had scripted it." Though Taylor's team lost the game, he did manage to get a crucial RBI and make at least two important defensive plays.

Taylor's comeback was the culmina-



WBTV sports reporter Bob Taylor produced the Iris Award winning special, "Diamonds Are Not Forever"

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tion of touching insight into minor league ball that involved a good deal of slow motion work, the grunginess of minor league dressing rooms, and the exhaustion of long bus rides to away games; yet it preserved the thrill and excitement of the minor leaguers in search of a major league career.

Loonis McGlohan, special projects manager for the station, produced the other Iris Award Winner, "The Rowe String Quartet Plays On Your Mind." McGlohan, a composer and jazz pianist himself (and a collector of misspellings of his name for obvious reasons) produced this beautiful and lyrical piece, which has been shown on several stations outside the market. A number of inquiries have been received about the possibility of syndicating the show. Anyone who has ever attempted to put together a program dealing with classical music or other such examples of fine arts can appreciate the genius of the program. Essentially, McGlohan decided to play off of the fantasies that are common to members of an audience attending a concert. A series of characters ranging from a little boy who was apparently dragged to the concert, to a would-be musician, a housewife, a little girl with dreams of becoming a ballerina, and an upwardly mobile black couple were established early on during their entrance to the concert hall. As the quartet performs various musical selections, and the focus moves from character to character, the picture dissolves into the characters' imagined responses. The little boy, baseball glove in hand, finds himself in a baseball stadium where he plays all the various positions and wins the game with a ninth inning homer. The roar of applause brings him back into the concert hall. The housewife finds herself in Charlotte's beautiful botanical garden where she encounters the quartet surrounded by beautiful flowers; the black couple enters a lavish restaurant and



Clara Lowry, WBTV's community affairs specialist, also does talent appearances on shows where community affairs are discussed



Creative Services Department is headed by Mark de Castrique, who feels that the blend of programming and commercial production done in his department keeps his people fresh

dances to a soulful Scot Joplin selection; and the would-be musician finds himself playing cello with the quartet and taking a bow after his performance. The little girl finds herself dancing both with a rag doll and a ballerina on a set of oversized blocks and toys. Time and again, the audience is brought in and out of these reveries by the concert hall audience's reaction.

This type of programming is part of what the philosophy of "returning something to the community," is all about. But there is even a more direct method of returning value to the community that is a big part of the WBTV effort. Every August the station devotes one full day of broadcasting to a special Boys' Town auction that last year raised \$104,000 for the local institution for problem children. An annual blood drive last year procured more than 1500 pints of blood for the local Red Cross. Community Affairs, in cooperation with the local chapter of the Cancer Society and a community hospital, has sponsored several editions of the PAP (Prompt Action Program) which in two years has screened nearly 2400 women in the Charlotte area for early signs of cervical cancer. Loonis McGlohan has spearheaded numerous outside efforts that have resulted in mini parks and race relations programs at city schools. The station takes its responsibility seriously. A twelve-member black advi-

sory committee consults regularly on community issues with the station. Ascertainment procedures meet, and more accurately, exceed the requirements of the FCC.

Hutchinson points out that local programming often outperforms network programming in terms of ratings and audience response at WBTV. This policy is a carefully thought out approach that is based on sound management principles. Over the long haul, these deep community roots will stand WBTV in good stead to fend off challenges by new technologies competing

for the home screen. The image of the station has assured it of a steady supply of talent in all areas. Management has remained incredibly stable with tenures more often than not extending well beyond ten years. At one time, the station considered the trend to titles for local news programs such as "Eyewitness News," "Action News," and other such consultant-inspired ideas, but found that the strength of its own name, "WBTV News," was so ingrained in the community that such a change would have been damaging to the program. **BME**

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# FLANAGAN



*"A station has to have its own guts."*

*Alvin G. Flanagan, President of the Broadcast Division of Combined Communications Corp., offers a few thoughts on local programming.*

"A station has to operate with pride. That's the only way to be a success with the audience and a success for the stockholders. Pride comes from substantive programming—and the most important function of a station is the local news and information programs you present. Those are the programs that give you 'localism'—involvement, understanding and reportage of what's going on right where you live.

"I think it all starts with an attitude. A station has to have its own guts before it can be good on the outside or good for the audience. If you can achieve a happy, working relationship with the people within the station, those who take pride and enjoy coming to work every day, then you have accomplished the first step. You have to have good surroundings. You have to have good equipment—good cameras, good tape machines—and all within a well-designed, functional building.

"You have to give people the tools to work with.

"Some management consultants say it all begins at the manager's desk. Yes, but the proper manager has to let go of a certain amount of his or her power—pass it out so that those people who run the news, engineering, financial and programming departments have their responsibilities. So they can say, 'This is mine and I am proud of what I have been able to do with it.'

"Where will our new talent come from? Well—I talk with college students quite often. I ask them, 'Can you do anything with your hands? Can you set the lens on a camera? Can you edit film; can you produce film? Can you sit at a typewriter and write a story? Can you take shorthand when you go down to the mayor's office to find out what his thoughts are on taxes and other things? Can you really do anything with your hands?' Because unless you can, there really isn't anything you can do. You have to be an artisan in addition to being well educated. It doesn't help much to say you can communicate with people. Practically everyone in the world can talk. The other day I showed a girl the nine editing benches and I showed her the technicians and photographers processing film and I showed

her that at each desk there was a typewriter and people sitting there typing like mad at 3:30 in the afternoon in order to be ready by news time. I pointed out that not only could they talk, they could write.

"If you have the people and they have the tools they need, and the pride and guts it takes, the rest is just plain hard work—to produce the news and information programs that give you 'localism'—a reputation for being a real part of your own community."

*Telek offers additional insight into current activities, trends and people involved in television production. If you wish to be added to our Telek mailing list, write us: Eastman Kodak Company, Dept. (640), Rochester, New York 14650.*



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# How Good Can Television Audio Be?

## As Good As You Can Make It!

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For years the audio debate has degenerated into an exhibition of different segments of the industry nominating each other to title of "weak link in the chain." Almost unheralded, developments in different areas have rendered most of the arguments moot.

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THE REASONS FOR POOR AUDIO QUALITY have remained the same over a long period of time in the history of television production. In the days prior to videotape, the arguments ranged largely around the fact that we were so concerned with the problem of transmitting pictures that no one paid much attention to audio. This is probably true. Then when videotape showed up and quadraplex recording developed, there was the legitimate obloquy that the emulsion on the quad tape was put on latitudinally to promote better video without concern for the fact that the audio portion of the tape was sacrificed. Moreover, the effect of curvature of the tape for necessary tape to video head contact resulted in an inherent wow and flutter problem as the tape attempted to flatten out before reaching the audio head. Improvements in quadraplex audio recording came with the years, and better tapes, pilot tone, and other features were added to help solve the problem.

Recording and radio segments of the industry fortunately provided the economic engine to get manufacturers to produce better quality production equipment. Consoles, microphones, amplifiers, audio tape recorders, and various types of audio processors for effects, equalization, noise reduction, etc., all progressed nicely under the gun of increasing popularity of high fidelity audio. Television continued to struggle along far behind its visual counterpart, the motion picture industry, when it came to audio quality. The drive needed to improve audio in television simply wasn't there. Even when one pointed to the continually improving quality of audio production equipment, television professionals could point at inadequate networking facilities supplied by AT&T, expensive and ineffective post production capabilities in the video medium for treatment of audio, and the ultimate "weak link" — the absence of high fidelity speakers and receivers in television sets.

An interesting historical sidelight is the fact that Motorola, in the late fifties, marketed high fidelity receivers for its television sets. These units turned out to be a fiasco in the marketplace. Not only were consumers unwilling to spend the extra money, but high fidelity had its drawbacks. Though Motorola touted improved audio quality, the people who bought the units tended to be audio enthusiasts who soon got the impression they were being ripped off. The audio performance of the sets was in fact much better, but the amount of studio noise, poor transmission characteristics, and low production quality

of the audio portion for contemporary television programs was more noticeable. Motorola soon withdrew the sets from the market, and television receiver manufacturers now had "empirical evidence" that good audio quality in receivers was not in great demand.

Motorola was not the only company that attempted to market high fidelity audio in television sets. Magnavox and others tried, but had the same results. There are signs now that Magnavox, Quasar, and others will soon try to take this path again. Set manufacturers are hoping that broadcasters will clean up their act and try to promote high fidelity audio. One suggestion is that broadcasters delivering high fidelity audio might make announcements prior to the show that, "The following program is being broadcast with high fidelity sound." This type of notice, say set manufacturers, was very helpful in promoting color television.

### Things have improved

So, one may legitimately ask, "What's changed?" The answer is, "A great deal has changed." The new Bell duplexing system inaugurated earlier this year is providing a full 15 kHz audio channel to television transmissions. The real possibility exists, and experiments have borne out, that a second channel could be duplexed to provide stereo transmissions. The new one-inch helical format video machines provide three audio tracks, two of which are of the highest quality and suitable to stereo recording. Additional channels are not the only improvement in the audio capability of the one-inch machines. Because the format is helical, the emulsion on the tapes is laid out in a more longitudinal manner better suited to audio recording. Beyond these two most dramatic improvements, there are an accompanying host of others mostly related to solid state electronics, though on some points, this would be disputed. Routing switchers are better, consoles are better, and the transmission system is better, including transmitters in general.

Perhaps the biggest boon to audio for television is coming out of the revolution in post production sparked by the use of SMPTE time code and the development of computerized devices for reading and synchronizing multiple recorders playing tapes with SMPTE time code.

There are a few places on the east and west coasts where the latest technology is being experimented with and exploited to its fullest. Sun West and Glen Glenn Sound in

Los Angeles are two of the most innovative audio post production houses. Two of the most sophisticated east coast post production studios are Teletronics and Regent Sound Studios. There are a handful of others, including EUE/Screen Gems in New York and Compact Video Systems in Los Angeles. What all of these places have in common is a strong program of building flexible audio systems under computer control to approximate, as closely as possible, the methodology of techniques used in film for building audio tracks.

Many other post-production houses are developing sophisticated audio facilities now that the crucial elements are available off-the-shelf. Still, there are enough gaps in the technology that different post production facilities are continuing to develop their own computer programming and specialized hardware. With the essentials available, however, in the form of synchronizers, high quality multi-track recorders, and computerized machine control systems, the doorway to better audio at the station level is at least ajar. The leaders are likely to be the networks, stations that produce specialized musical programs (like WGBH, Boston, which has been in the high quality audio business for some time) and stations that produce a heavy load of commercials.

The signs are all present that the way to better audio can be traversed. Stations are buying sophisticated audio consoles and replacing their audio routing systems with higher quality systems offering multiple audio crosspoints for carrying stereo audio and time code. One-inch VTRs are likely to become the replacement machines of choice whether the station is looking for improved audio or not.

The last major roadblock to high quality audio will no doubt be the poor acoustical design of most television studios. Now, with the physical plant available, what needs to be accomplished?

#### "Perfection" is within reach

Bob Fine, a consultant who has helped build facilities here and abroad, and traces his professional experience back through some forty years of recording, film, and television history, believes that we are working our way back to the double system approach to recording audio. "Double system is now very possible," said Fine. Things change during the production of a television program, he explained, "and you want to be able to treat sound as a separate medium."

The problem with single system recording is obvious. Even when your intention is to simply work with the picture, you are still editing the audio. Generations are lost and quality degraded. One way around this has traditionally been the stripping of the audio onto a second quad recorder. When the picture editing is completed, then audio editing is performed and the original sound track laid back onto the videotape. The drawbacks to this approach are obvious. About the only thing that can be accomplished is a little "sweetening," which Fine says has often amounted to no more "than having a guy listen to the audio track and levelize and equalize and just dub back the whole audio track again."

The other obvious drawback to this system, besides its lack of flexibility, is its cost. Using quadraplex recorders to work with the audio is an expensive proposition, let



View of Regent Sound Studio's "full up" audio editing system. The "brain" of the system is the MQS-100 synchronizer housed in the console (center-right) which also contains remote controls for the various Ampex audio machines (background)

## How Good Can TV Audio Be?

*The Teletronics audio editing system provides console top control of various 3M multi-track and half-track recorders as well as cart machines, cassette machine, and two Magnatech 1635 dubbers (not shown)*



alone the fact that you are using machines with less than optimum audio performance.

The film medium, Fine points out, has never had this problem. The existence of sprocket holes has always preserved a common timing system that permitted the audio to be treated separately and locked synchronously to the picture at any stage of the process. The advent of SMPTE time code has brought to the videotape medium the electronic equivalent of sprocket holes, says Fine. Now it is possible to remove the audio to less expensive, better quality audio equipment for post production work with the complete assurance that you will be able to get the two elements of picture and sound back together again.

This capability is only part of the solution, however. It is at this point that Fine sees much room for improvement. According to Fine, the audio facility which he helped design and build at Teletronics, in New York, is as close to the state of the art as can be found anywhere in the U.S. The system at Teletronics consists of a custom Audio Designs console with a custom-built EECO synchronizer/computer built into the console's front panel. Machine control of two multi-track 3M M-79 audio recorder/players, a 3M half-track 1/4-inch recorder/player, a 3/4-inch video cassette player/recorder, and two Magnatech 1635 dubbers are all remoted to the console. Each of these machines are time code synchronized through the EECO system. Remote control of four audio cart machines is also present on the console.

Original material coming in on quad videotape usually consists of video, audio, and time code, which are all dubbed to other machines. Video and time code are dubbed to the 3/4-inch videocassette machine, and audio and associated time code are dubbed to one of the multi-track machines where time code is recorded on one track and audio on another. Other audio elements are placed, with time code, on appropriate machines. The other multi-track gets one track of time code. All the elements can now be built up on this master. The elements may consist of a dialogue track, additional music tracks, effects track, announce track, or any other audio element desired. All audio signals are routed through the Audio Designs console where they can be adjusted for level and equalization.

Using the EECO computer for machine control, the spacial relationships between the various sounds can be

controlled. Each different element is recorded on a separate track of the multi-track recorder. When each track has been built successfully, the composite audio track is then laid back on the quadraplex master.

Blair Benson, vice president of engineering and technical operations for Teletronics, points out that though the system is almost as good as it can be, he expects further improvements as the facility switches over to one-inch videotape machines. Greater flexibility will also be developed when reprogramming of the computer is completed.

Whereas Fine believes the system to be one of the best around, he would like to see an even greater degree of discreteness maintained for a longer period of the post production process. "The solution," said Fine, may be something like the Cuerack 500 cart automation system." With 500 carts to work with, it might be possible to keep all elements separate so that fine tuning of the audio track can be accomplished all along the way, according to Fine. Fine cautions, however, "You cannot isolate yourself from economics." In an hour-long filmed drama, Fine says, there may be as many as 16 or 17 tracks that they try to keep separate until the final mix. There may be four or five people involved solely with the audio post production, according to Fine, and the only way that this is made economically feasible is that the different tracks are kept separate and worked on with relatively inexpensive equipment. "At \$240 per hour to build audio tracks (in a video system), it discourages doing excellent sound in video." Fine believes an off-line editing approach that would use SMPTE time coded material on machines similar to the Convergence joystick-type editors holds some promise. "When you get the cost down to a \$25 or \$50 an hour business, then you're in the area of what it costs to do excellent audio in film." Says Fine, "Video would best succeed if it would emulate, in its form, techniques developed for film."

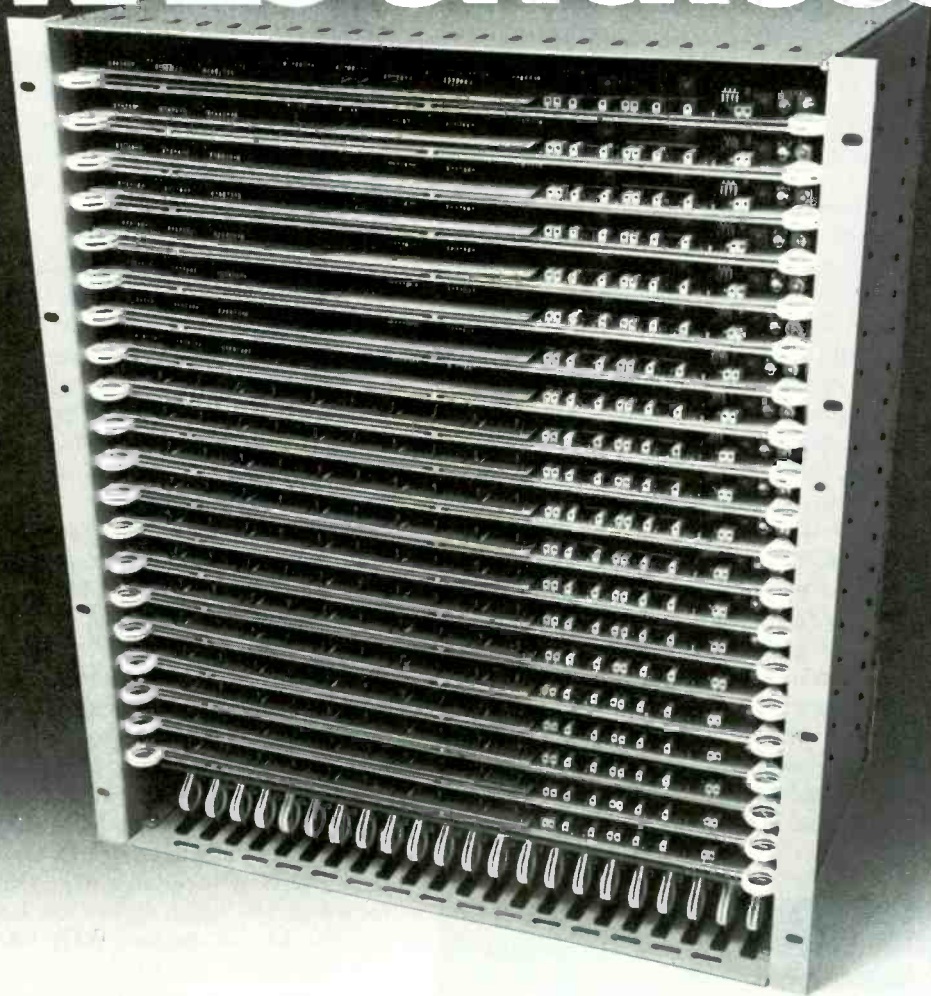
### Audio at its best

Fine's reservations about the perfection of audio for television are somewhat offset by the unabashed enthusiasm of Bob Liftin, president of Regent Sound Studios. Says Liftin, "You can make audio for television

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## How Good Can TV Audio Be?

as good as the best quality audio you can make, period. Quality," says Liftin, "is a very weird word to use because the quality was always there. There are tremendous misunderstandings about quality audio for television that have to be straightened out."

Liftin's point is that the equipment that is used to produce the highest quality sound reproduction in any other medium, can also be used to produce the audio for television. Add to this the possibility of adopting the craftsmanship and techniques developed in other areas, and it's apparent that audio can be as good in television as anywhere else.

The only real drawback is the lack of demand for high quality audio in television. Both Fine and Liftin see this situation changing with increased demand being generated by commercials, the spread of cinematic technique into the production of videotaped documentaries and specials, and above all, an increased enthusiasm for good sound on the part of the public. FM radio, home stereo systems, superb audio in film, are all cited as examples of increased public demand for good sound. With AM stereo in the offing, just how long television will be able to withhold high quality audio is in question.

It is not so much a matter of television holding out, however, as it is a matter of correcting those misunderstandings that Liftin spoke of. To demonstrate the possibilities held open by good audio, Liftin played a ¾-inch videocassette program entitled "Going Places." "Going Places," produced by Yuri Zebren, is a half-hour popular music program currently making the rounds in an attempt to become a syndicated feature for the late night television audience in the 18 to 39 age range. The program was shot on film, edited on tape, and the sound track was mixed at Regent Sound. What Liftin has done is to record

the sound track in stereo and then lay it back using the two audio tracks available on the ¾-inch tape.

The program is essentially a series of visual vignettes interpreting the music and lyrics of soft rock music. The pictures are beautiful and use all the special effects available without being hokey. The sound track consists of the music plus ambient sound relevant to the visual scenes. Ocean sounds, seagulls, voices, automobile engine sounds, highway sounds, and a wide variety of other effects are used.

For the demonstration, Liftin switches the audio between the simple monitor speaker, a pair of inexpensive stereo speakers, and a couple of expensive high quality speakers. The purpose of Liftin's demonstration is to prove that audio for television can be as good as you can make it.

The demonstration is an unbridled success. The greatest effect is obtained when the best speakers are used, but even when Liftin switches to the cheap stereo speakers, the effect is tremendous. Waves crash across the screen diagonally and the relevant audio moves with it. A sports car drives screen left to screen right and then moves off into the distance, and the audio moves likewise. Another car flashes across the screen and the Doppler effect is preserved. Foreground audio and background audio remain in context.

Admittedly, these stereo effects are destroyed when Liftin switches to the single speaker in the video monitor, but nevertheless, a richness of sound quality and presence is maintained that is unequalled by anything this reporter has heard on the home screen. And all of this was preserved on two of the weakest links in the chain, a television speaker and a videocassette player.

Regent Sound Studios has been engaged in an ambitious program of building what Liftin describes as the best post production system available. The heart, or better, the brain of the system is an MQS-100 Computerized Synchronizer manufactured by EECO and distributed by Ampex. The system controls two Ampex 4000 multi-track recorders for which Liftin has both 16 and 24 track headstacks, an Ampex ATR-100 half track ¾-inch recorder/player, and a ¾-inch videocassette machine. All audio signals are routed through a 24-channel MCI VAC controlled console equipped with both PPMs and VU meters.

Liftin and his engineering staff have done little to the stock equipment except design the remote control system interfaces. He wanted to make the machines being controlled transparent to the computer so that he could quickly bring on-line any number of alternative sources.

Liftin, who maintains that he was once a strong proponent of the "build it yourself" school of thought, now argues that buying it off the shelf is the way to go unless what you need simply isn't available, as was the case with his remote control interfaces. "If I could build it rather than buy it," says Liftin. "I would. I have since changed my mind because buying it is cheaper in the long run."

One reason for this change of mind is the quality of solid state equipment. Says Liftin, "I found that with transistorized equipment, with proper design and proper care, it will do just as good a job, and in some cases, a better job than tubes ever did." Here Bob Fine and Liftin could get into a good argument, since Fine believes that the trend to solid state equipment has forced audio professionals to give up a great many benefits of older tube

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Close up of Regent Sound Studio's machine control editing console. Completely accurate sound to video editing is possible with this system. Effected tracks are switch selectable (top). Machine control panel (middle) is custom built, and MQS-100 (bottom) provides intelligence

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## How Good Can TV Audio Be?

technologies. Fine believes that tubes, for one thing, had much better headroom than transistors do and further believes that the test and measurement techniques used to create solid state specs are literally hokum.

On the other hand, Liftin believes that what has been gained in signal to noise with solid state equipment more than compensates for the loss of headroom. The loss, says Liftin, is really not important if you exercise the proper care to avoid overshooting in the first place. Moreover, Liftin's opinion is that tubes cannot compare with solid state systems for uniformity of performance. "With tubes," Liftin said, "you have an aging problem, and their performance changes with heat buildup and other variables." Similar problems exist with some transistorized equipment, but nowhere near the degree to which tubes systems are plagued. Liftin's farewell salute to tubes is that "transistors and solid state electronics are the wave of the future. Tubes are no longer manufactured carefully or available generally. Tubes are being phased out."

The last problem for television audio that Liftin now feels he has licked is that of an efficient audio editing system, "at least as good as the best computerized video editing system." To demonstrate this, Liftin put on a virtuoso performance of rock-and-roll editing using his MQS-100 editor. (Liftin prefers to refer to the MQS-100 as an editor, since synchronizing is just one of the things that it does.) Using a videotape that utilizes a montage of stills to emulate Wimbledon tennis action, Liftin moved

music, crowd reactions, and the sound of tennis balls being whacked back and forth in relationship to the picture. Obtaining perfect sync between a 15 frame still of a tennis racquet and the "pock" of a tennis ball strike was no problem. Time code lock-up of the picture to the sound was achieved in seconds and single frame adjustments in forward or reverse were simple.

The one weak link that both Fine and Liftin readily agree on is the simple lack of craftsmanship devoted to audio production in the first place. Fine would like to see video shot cinema-style so that optimum mic placement could be achieved on each take and scene. He would also like to see a video equivalent of automatic dialogue replacement techniques used in the post production of film. Liftin would like to see greater care given to the setup of quad machines for audio recording. A confidence head is essential, says Liftin, and he bristles a bit when he thinks about the new one-inch machines. To Liftin, it is incredible that the new one-inch VTRs went so far towards improving audio and then failed to provide a separate audio playback head, which Liftin feels is absolutely essential to adjusting audio for optimum quality.

All things considered, it is the opinion of these professionals and many others that the time to begin providing better audio for television is now. The technology is here. The techniques are available in the craftsmanship of the film medium, and devices yet to be manufactured hold out the promise of economy as well as quality. If broadcasters begin to explore the possibilities of audio, new programs and new audiences may be there for the effort. It might even be possible to get a job back for some poor devil at Motorola. **BM/E**

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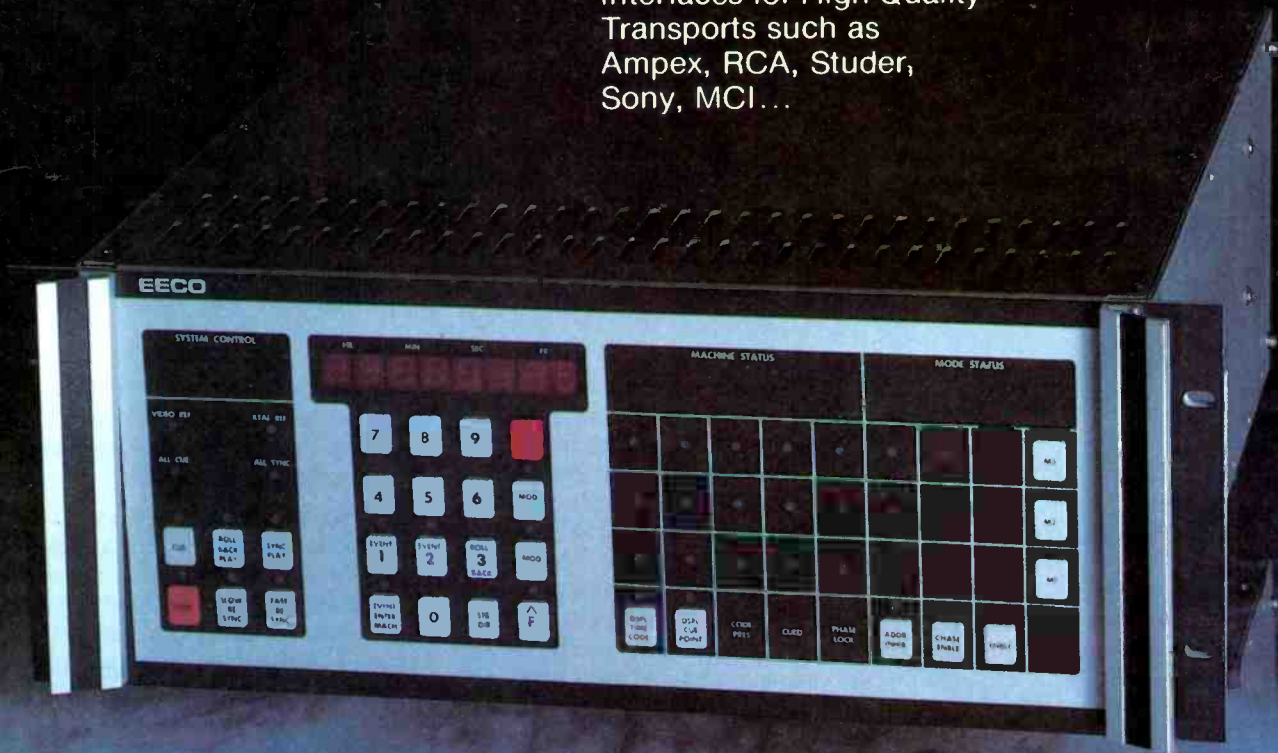


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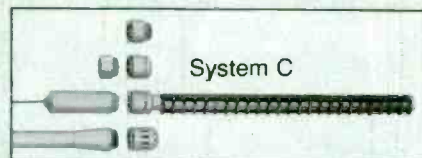
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# SMPTE Time Code Synchronizers: Increased Control In Audio For Video Production

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Synchronizing sound with picture has always presented a problem. Film solved it with sprocket holes years ago. Videotape did it with SMPTE time code. Now the way is clear for audio production with quality at least equal to that of film.

---

VARIOUS METHODS FOR SYNCHRONIZING AUDIO with video have been tried over the years. Today's systems which depend on SMPTE time code have surpassed the old capabilities, and have begun to offer television the means with which to give the other media a run for their money in audio quality. The process has been a long time in the making, and a brief trip into the history might be helpful.

The use of "tones," or time codes in videotape editing is not a new concept. Only when several manufacturers entered the field of electronic editing, however, did the natural move to code standardization occur. It was then, in the late sixties, that the need for this standardization was brought to the attention of the Video Tape Committee of the Society of Motion Picture and Television Engineers.

In 1970, Ellis K. Dahlin headed a SMPTE subcommittee, the members of which included engineers in both the user and manufacturer areas. After reaching agreement on a serial time code called the SMPTE Control Time Code, manufacturers began designing equipment for its use.

The SMPTE time code was originally conceived to assist in, and provide an accurate method for, the electronic editing of videotape. Now, with a growing interest in increasing the quality of audio on videotape, SMPTE time code synchronizers, generators, and readers, and computerized systems employing the code, are enjoying a greater degree of availability, and wider use, in audio/video and audio/audio applications.

## The btx 4500 SMPTE synchronizer

This synchronizer is one of a number of btx SMPTE time code products that form the basis for a low-cost, building block, synchronizing system. The other units are the 4100 TC generator and the 4200 TC digital display. The 4500 itself is a microprocessor-based system which is able to control the capstan motors of magnetic tape recorders to synchronize them to any available source of SMPTE time code. Built-in calibration software allows in-the-field interface with the particular make and model of servo-driven capstan recorder available. With the use of a power amplifier, the unit can also be used with 60Hz AC-driven capstan recorders. Precisely reproducible synchronization, with offset, is possible to  $\pm 50$  microseconds at code level playback as low as  $-12$  dBm. The

synchronizer accepts the time code from both the master and the slave. It puts out both a DC control voltage for DC capstans and a square wave frequency for AC-controlled capstans.

At Soundmixers, New York, president Harry Hirsch says that he has been waiting a long time for SMPTE to come into his particular area. Soundmixers is a multi-track recording studio, which, in addition to making records, also does sound for films and commercials. In his sound for commercials operation, Hirsch found it very frustrating to be locked in to only the audio production aspect. After the audio track for a commercial was recorded, the client would take the product and go to a film mix theater to synchronize the audio to visual. Soundmixers has wanted to do audio for video, and now with the 4500, they are able to do so.

A typical application of the 4500 would be to take a client's 35mm film and transfer it to U-matic cassette while applying the time code to one track of the audio. At the same time, the code is put onto one track of a multi-track recorder. While directing his orchestra, the conductor is able to view the video portion to which the music will be applied. In this situation, the picture is the master, and the music is the slave. The machines can now be locked up. The client no longer has to go to "sprockets" to do the mix. The capstan machine now has electronic "sprockets."

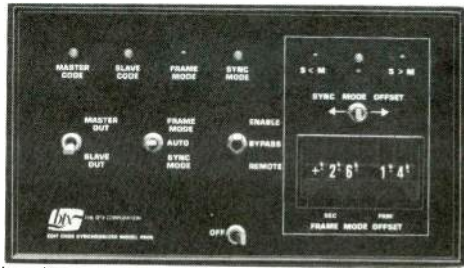
Soundmixers also uses their synchronizer to take a 24-track recorder and sync it with another 24-track recorder in order to have 46 tracks (one track on each machine must be allocated to the time code).

Another application of the 4500 has allowed Soundmixers to offer a service they call Vidicue. Essentially, it is a process in which the conductor is videotaped during a recording session. His cues and directions to the performers are recorded. Once this is done, he is free to leave the studio. The videotape, which is synced to the multi-track recording, can now be used to cue and direct the performers in the event that overdubs are needed. Even though the conductor is no longer in the studio, the performer is able to hear him on a cue circuit, and see him on a monitor.

Hirsch said that although his staff has been using the 4500 for only four months, they are very excited about it

continued on page 48

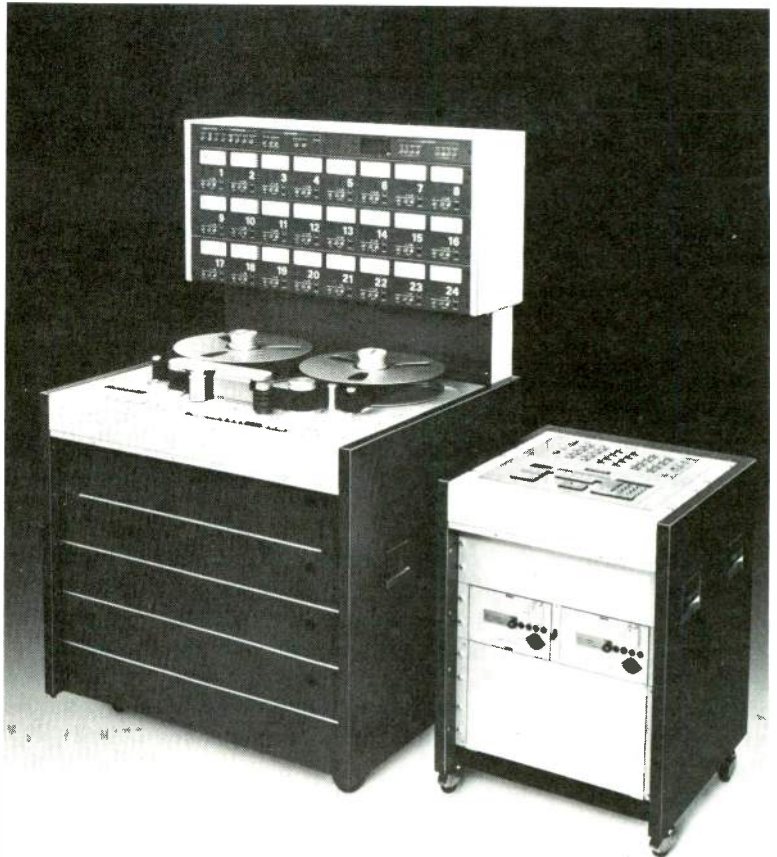
## SMPTE Time Code Synchronizers



*btx 4500 audio-to-audio and video-to-audio SMPTE time code synchronizer*



*Soundmixers' MCI console with btx SMPTE components stacked. Top to bottom, the 4100 TC generator, the 4500 TC synchronizer, and the 4200 TC digital display*



*Above right, the Studer TLS 2000 tape lock editing and control system shown with the Studer A 800 24-track recorder*

and are looking for new ways to apply it to their operation. Hirsch also commented that they are looking to btx to provide a programmable unit which will allow them to preview sound effects.

### The Studer TLS 2000 tape lock system

The Studer system is more than just a synchronizer; its features make it a synchronizing and electronic editing system for audio/audio, audio/film, and audio/video applications. In addition to synchronization of two machines in the forward mode, the TLS 2000 will allow two machines to track each other under all conditions, including fast forward and rewind. The slave machine for the 2000 must be either the Studer A 80/VU or the A 800 recorder. However, no interface is necessary for syncing up to non-Studer products as long as the SMPTE time code can be provided. The 2000 allows for precise electronic editing and features an autolocator, based on time code or real time, which is programmable. It has a synchronization accuracy of  $\pm 100$  microseconds, and operates at any frame standard: 24, 25, 29, 97, or 30 fps with offset up to  $\pm 24$  hours.

John Ellison, studio manager at Eastern Sound Co. in Toronto, says, "What you can do with it is strictly limited by the ingenuity and the knowledge of the people that are using it." Ellison also said that it's totally new, insofar as the capabilities it provides have never existed before.

Ellison gave the following example of one of the most elaborate things done with the system—the recording of a TV music/variety show on two-inch videotape. In the past, the audio had been done one of two ways. One way used a console and recorded the audio right onto the videotape. In this case, what you get is what you hear. The other way was to use "a primitive sync system" to record the audio on a multi-track audio tape machine. That is essentially what Eastern does with the Studer system, but with far more precision than any of the previous systems which were locked into frame accuracy. With the Studer system, the capability is there to subdivide the frame into approximately 57 milliseconds. This allows the adjustment of sync to be fine tuned. It also reduces the possibility of even the slightest error, which can make lip-syncing look mechanical and unnatural. The final product can be made to look "perfect," so that the viewer will not be aware of any post-production technique.

As the video is being recorded, with time code, a rough audio mix might also be recorded. The "real" audio, however, is being recorded with a studio-quality mobile facility, using multi-mic, multi-track, and high speed tape techniques including noise reduction units that were never available to the videotape people before. After the "shoot," the videotape is edited to a one hour show (with the rough audio mix included). At this stage, a  $\frac{3}{4}$ -inch

continued on page 50



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## SMPTE Time Code Synchronizers

cassette of the finished video is handed over to Eastern. This tape now has a new zero to 60-minute time code.

The original 24-track audio might be pre-mixed down to four tracks of an eight-track machine. Now, armed with the video cassette and a rough edit sheet, the audio has to be synced to the right parts of the video. In the assembly of the audio portion of the program, an eight-track machine, with a zero to 60-minute time code, is assigned as the slave. Now the process of building the program begins. The first segment, which might be a performer singing followed by applause, is synced up and the audio is recorded. After this segment, the audio for the following ones is found and synced up. At the instant of a cut or edit, the Studer can be programmed to start recording. After the complete show is put together in this fashion, the audio track is sweetened, adding anything from applause to glass tinkling (if it happened to be a night club performance.) All tracks are then mixed down to mono on the same tape, again with picture. The eight-track machine is then locked up to the master videotape and the audio is applied.

The final product is an audio track that has taken advantage of higher tape speed, noise reduction units, and far more extensive audio devices than would otherwise be available. What results is a better quality audio product that video is not used to. And since the audio is then put right onto the master videotape, no generation loss is suffered.

With the Studer 2000, anything that can be done to improve the mix in record album production can be done to improve the mix for a video program. In the situation above, it would even be possible to add a string section to the music, although the TV audience would never see it.

Eastern Sound has been using the TLS 2000 since August, 1977. The increased capabilities that the system provides have induced an approximate growth of 50 percent in Eastern's business.

## EECO's MQS-100 synchronizing system

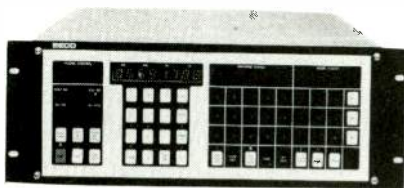
This microprocessor-based system can simultaneously cue and synchronize any three magnetic tape transports, including video, audio, and mag film. The SMPTE/EBU edit code, used for indexing the tapes, need not be identical, and tapes with drop-frame and non-drop-frame formats can be intermixed. System modes include high speed search and cue, follow the leader or "chase mode," synchronized playback, fast and slow re-synchronization and roll-back with automatic re-synchronization.

A one-button control actuates all transports to roll-back, start forward, and synchronize automatically. In addition to a plus or minus offset of any selected time, time code readings for all tapes can be captured "on-the-fly," individually or simultaneously. Synchronization accuracy is  $\pm 100$  microseconds. The chase feature of the MQS directs the slave transport to follow all master transport actions, thus permitting the operator to control cueing and synchronizing at the front panel of the master transport.

Bob Liftin, president of Regent Sound Studios, New York, is using the MQS-100. Liftin says that with the MQS-100, they have an audio editing system as good as the best of the video systems. As an example of the application of the system, a musical show was considered. Depending on the complications of the show, it would be recorded on multi-channel. The orchestra would be on several tracks, the vocalist would be recorded separately, and a live pick-up of the vocalist in a studio setting would also be recorded. In other words, the show would be pre-recorded in addition to the live vocal so that if, in the mix, there were lip sync problems, it would be possible to go to the live vocal plus audience reaction.

Formerly, the mono mix was done on the quad video. The quad video was then edited, and edited, and edited, and each time, another generation of audio was made. If sweetening were needed, the audio was stripped from one

continued on page 52



(Above) The EECO MQS-100 synchronizer can cue and sync any three mag tape transports with SMPTE TC



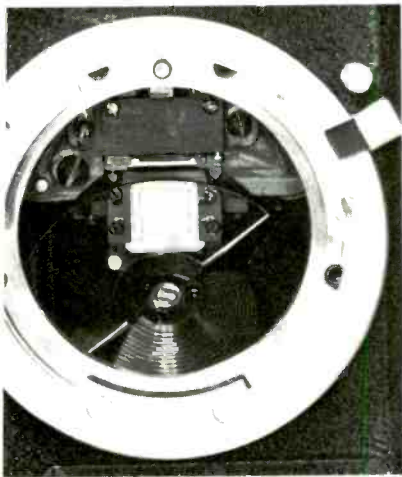
(Right) Regent Sound Studios mounted their MQS-100 in a free-standing console (pictured right center) with their custom built remote controls

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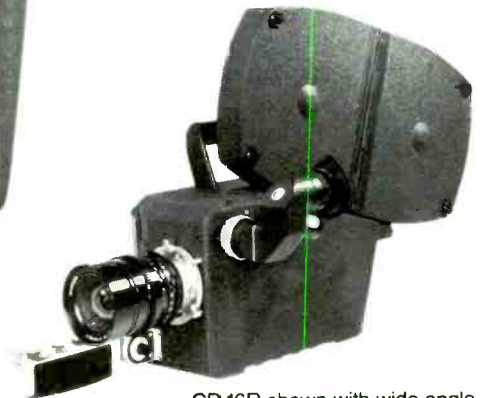
### New Viewfinder System

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## SMPTE Time Code Synchronizers

quad machine to another, the sweetening was added, and then the audio was put back onto the first quad machine. The reason for this was that the quad machines could be locked up to each other by the control track. Once the machines were synchronized, they would stay there.

Liftin also remembers that five or so years ago, an attempt was made to take multi-track tape recorders and interface them with video editing systems. What happened here was that the console that operated the multi-track machines was strictly a television console with very limited facilities. An eight-track console, the favorite one used, would take the original audio and put it on one channel. The sweetening would be put on another channel. The problem was that the consoles didn't really have eight tracks. The boards had maybe ten positions in and four positions out, or some other configuration. Because this took place in a facility primarily concerned with video, maintenance of the audio equipment was often lacking.

The quality on quad was horrendous, of course, because the oxide faces the wrong way for the audio and the audio head. The curve was bad because it was a 15 ips NAB audio curve which was noisy to begin with. The biggest problem by far was that there was no way to line up the machines.

The use of SMPTE time code synchronization is not new at Regent Sound Studios. Back in 1974, Regent was

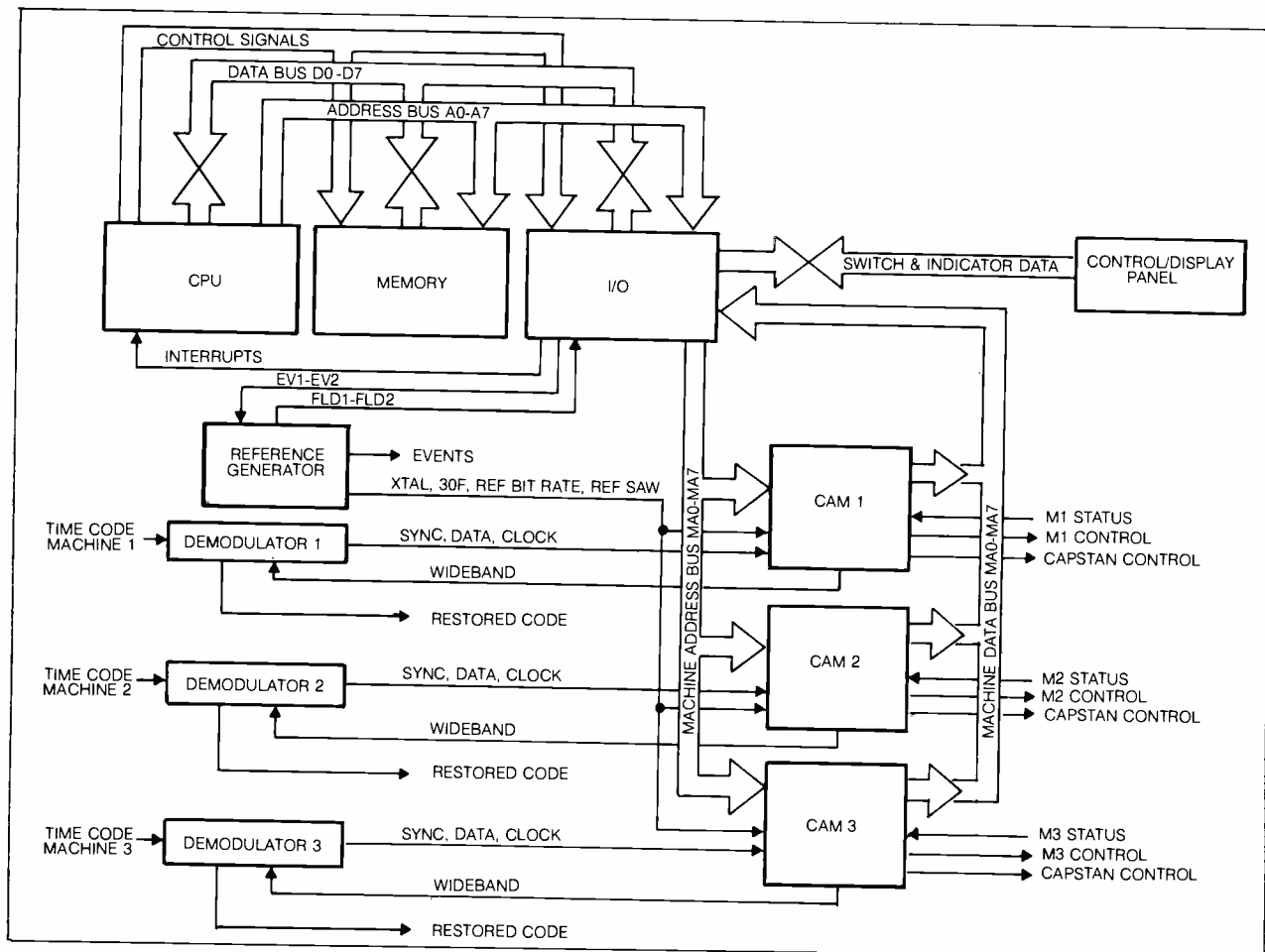
in the middle of a recording session with Les McCann. He wanted to take two machines and hook them together in order to have more than 16 tracks. Coincidentally, a flyer from EECO promoting their 450 synchronizer made its way to Liftin's desk. A synchronizer and reader were purchased right away.

With little experience in time code procedure, Liftin began by using time code from a pre-recorded source. Dropouts and generation problems soon prompted him to buy a time code restorer. Regent began to do video work, and although the system worked satisfactorily, Liftin continued to look for a system "dedicated" to audio editing. He found the MQS-100, distributed by Ampex, and settled with it as the full-up audio editing system that he wanted.

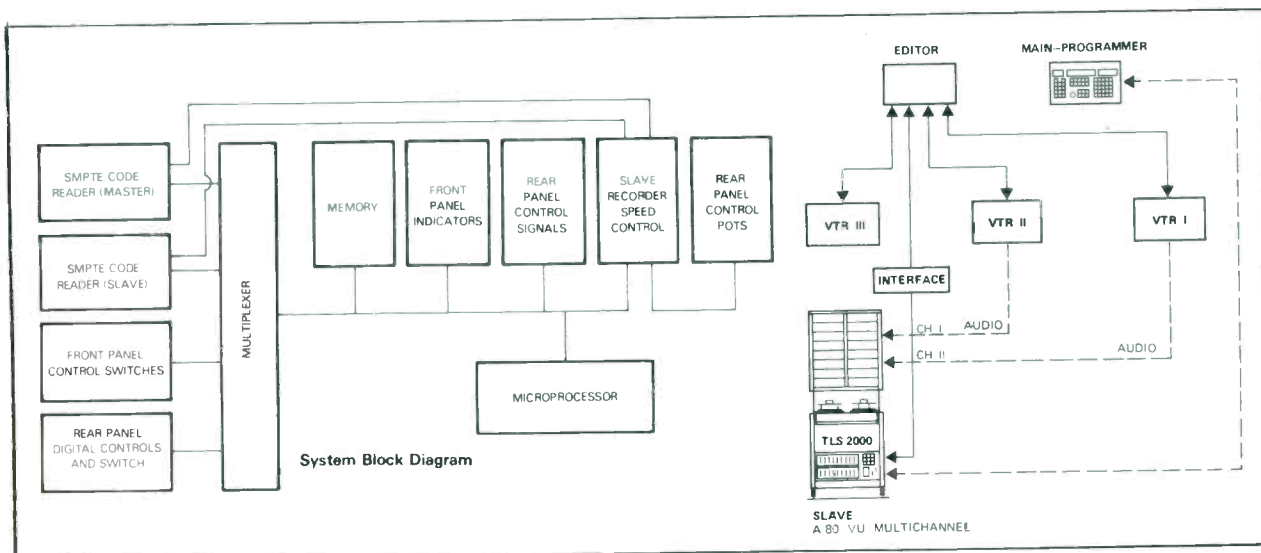
According to Liftin, "In audio you have to be able to take your master and your playback machines and relate those two sync times to be able to edit. The MQS does this. It is also important to be able to start machines for a sound effect, and to be able to record in and record out at any time, and the MQS has a whole keyboard for that."

As mentioned above, the MQS-100 can cue and synchronize any three magnetic tape transports. It is a sophisticated editing system with the capability to perform the same functions as described in the production example given for the TLS 2000. Studios involved in double system audio/video editing would find the MQS most suited to their operation.

A basic synchronizer such as the btx 4500 is basically for someone who has a tape recorder complement and is



Synchronizer block diagram of the EECO MQS-100, distributed by Ampex



Above left, system block diagram of the btx microprocessor-based synchronizer

Above right, diagram indicating the full integration of the Studer TLS 2000 interfaced with a video editing system

merely trying to do a more complex job of audio and video production. Or, it's for someone who has been doing all his video production with the audio on the two audio tracks of the VTR, and now wants to upgrade his audio by recording double system and then dubbing the audio onto the videotape. It is at this point that a synchronizer is needed. The limitation of a synchronizer such as the btx is that even though it will sync any two machines together, it works only in the forward direction, either play or record. If it is necessary for the two (or more) machines to track each other in all modes, a more sophisticated machine,

like the TLS 2000 or the MQS-100, will be needed.

The point is that synchronization exists at least at two levels: the simple situation of syncing any two machines together without having to do any heavy editing, and the production studio or broadcast station that is heavily into program production, where much more than mere machine sync is needed. In this case only an electronic editing system can fill the bill. Such a system costs four times as much money because it has four times the circuitry. It is a minicomputer as well as a synchronizer.

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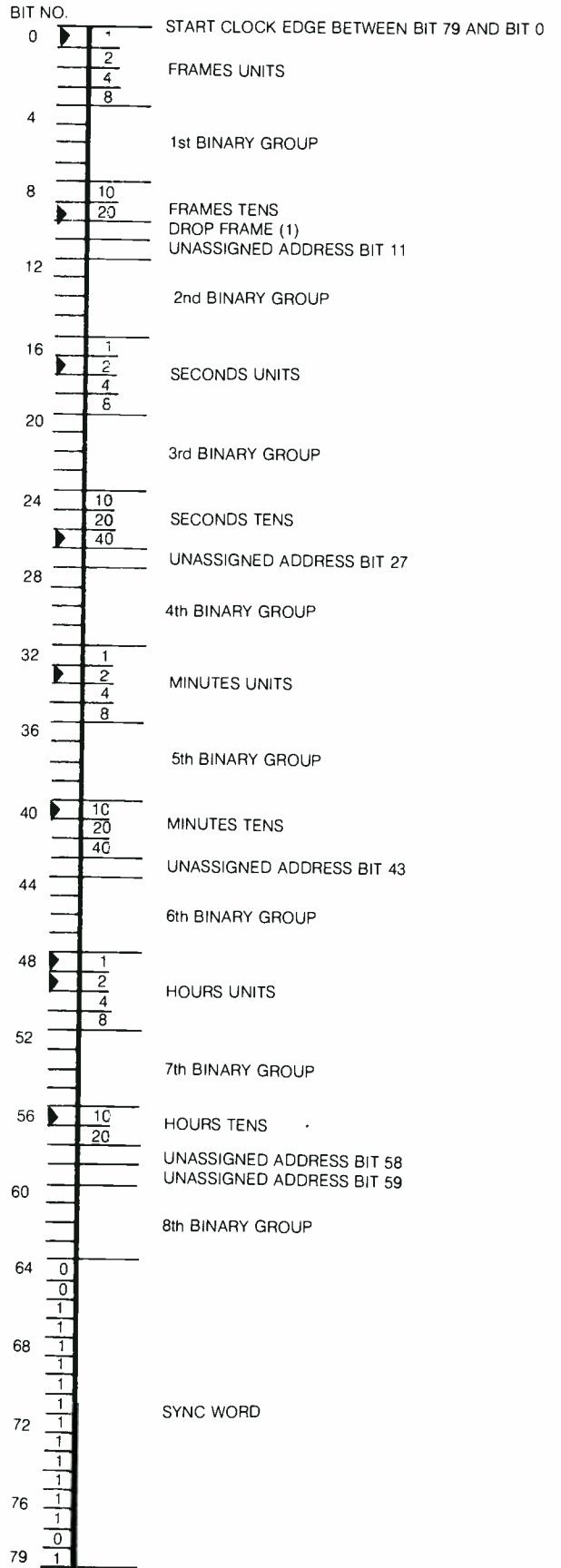
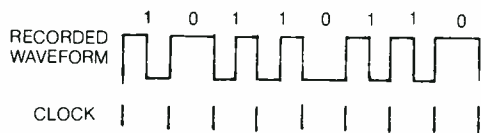
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## American National Standard Time And Control Code For Video And Audio Tape For 525 Line/60 Field Television Systems

This standard specifies a digital code format and modulation method for video and audio magnetic tape recorders to be used for timing and control purposes. The standard also specifies the location of the code on the tape and its relationship to other signals on the tape.

The modulation method shall be such that a transition occurs at the beginning of every bit period. "One" is represented by a second transition one-half a bit period from the start of the bit. "Zero" is represented when there is no transition within the bit period (see figure).

Each television frame shall be identified by a unique and complete address. A frame consists of two television fields or 525 horizontal lines. The frames shall be numbered successively zero through 29.

Each address shall consist of 80 bits numbered zero through 79. The bits shall be assigned as shown in the figure and as described below:

0-3	Units of frame
4-7	First binary group
8-9	Tens of frames
10	Drop frame flag
11	Unassigned address bit
12-15	Second binary group
16-19	Units of seconds
20-23	Third binary group
24-26	Tens of seconds
27	Unassigned address bit
28-31	Fourth binary group
32-35	Units of minutes
36-39	Fifth binary group
40-42	Tens of minutes
43	Unassigned address bit
44-47	Sixth binary group
48-51	Units of hours
52-55	Seventh binary group
56-57	Tens of hours
58-59	Unassigned address bits
60-63	Eighth binary group
64-79	Synchronizing word
64-65	Fixed zero
66-77	Fixed one
78	Fixed zero
79	Fixed one

Bit number 10, the drop frame flag, is used to indicate whether or not certain numbers are being dropped to resolve the difference between real time (that which it takes to scan 60 fields in a TV system with a vertical field rate of 60 fields per second) and color time (that which it takes to scan 60 fields in a color system with a vertical field rate of approximately 59.94 fields per second).

Bits numbered 11, 27, 43, 58, and 59 are unassigned address bits. They are defined as zero until assigned by the SMPTE.

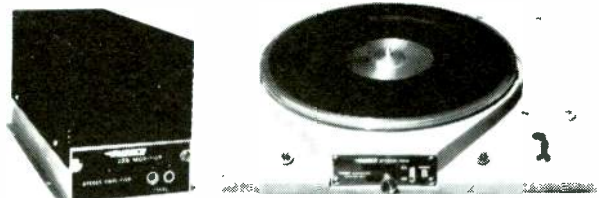
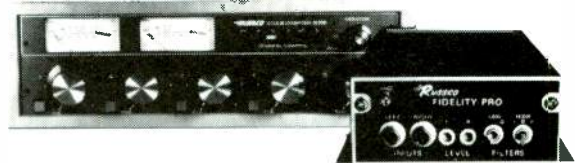
The binary groups are intended for storage of supplementary data by the users, and the 32 bits within the eight groups may be assigned in any fashion without restriction. It is anticipated that the use of these bits will be standardized in the future.

The SMPTE/EBU edit code is an electronic signal that switches from one voltage level to another about 2400 times a second (2000 for 25 frames per second). This divides the signal into "bits." As stated above, 80 bits are assigned to each frame (or address). Many of the bits have a value that is counted only when the voltage level changes again in the middle of a bit.

With this understood, it may be seen that with given voltage level changes in bits zero, and nine; 17, and 26; 33, and 40; and 48, 49, and 56, a time code readout of 13 hours, 12 minutes, 42 seconds and 21 frames would be produced (use figure).

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# STUDER



# What Noise Standards For The 1980s?

By Richard Sequerra

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The technique of broadcast design is advancing so rapidly that almost any quality standard could be achieved today. In this article, an expert discusses what our standards for noise in broadcasting should be.

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EVERYBODY KNOWS THAT STANDARDS FOR AUDIO in broadcasting are rising, but hardly anybody has tackled the question, how high is up? What should we be shooting for? This question will be addressed here, with special emphasis on what our standards for noise levels should be. But that also necessarily involves, as we shall see, other major forms of distortion. In psychoacoustics, which is the relevant science, almost nothing happens all by itself.

We can eliminate right away the idea of "perfection" in the sense of "total fidelity to reality." No sound reproduction system can fully recreate reality. What it does do is provide a pleasing illusion for the listener. Our job, then, is to understand what is "pleasing." Our experience and our knowledge of psychoacoustics will give us the leads for investigating this question.

There are a number of reasons why what comes out of a loudspeaker cannot be "real." For one thing, the actual dynamic range of real sound is around 120 dB. The maximum for sound systems is around 90 dB, transducers don't go above about 70 dB, and the average for most good systems today is 40 to 50 dB.

For another thing, there are the extra signals that every sound system adds to the program — the various forms of distortion. We can reduce these greatly, but we can't eliminate them. And there is the very important fact that reproduced sound is delivered into a variety of acoustic environments. In assessing it, we have to know every part of the chain, from acoustic input to acoustic output, because what is "pleasing" depends on all the particulars of the case. For example, in a car the signal is delivered into a very high amount of ambient noise. A pleasing quality here could be quite different from a pleasing signal delivered into an ultra-quiet living room. But that room also establishes specific acoustic conditions which affect our judgment of "pleasing." The room is not "free."

Very important, of course, is the quality of the receiving equipment. In the past, the quality the broadcaster was satisfied with was far too often pegged to his judgment of

the least common denominator among his listeners' receivers. This will be discussed in more detail below.

Another factor in "pleasing" is the listener's expectation, and this depends largely on the listener's experience. Today most of our music reaches us through electronic

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Important among factors taking broadcast quality to new, higher levels are the new electronic-control turntables, of which the EMT 950 (sold by Gotham Audio in the U.S.) is one. Flutter is nearly non-existent; noise is an order of magnitude lower than on many earlier tables

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**Richard Sequerra** is president of Pyramid Loudspeakers, New York, speaker manufacturers, and of Scientific Consultants, audio and radio consulting engineers.

## Noise Standards For The 1980s

reproduction. Thus our reference, our feeling for what is "right," is biased toward loudspeaker-produced sound. The last major stronghold of "natural" sound in our daily experience is the human voice, which is why the voice is one of the best sources for checking the naturalness of sound reproduction. But we have to be very careful to compare the reproduced sound with the live voice, and not with the other reproduced voices that are all around us too. If we hear a 24-track recording with artificial reverb, flanging, synthesized passages, etc., there is no reference in reality, however. "Pleasing" belongs only to the sound as we hear it.

We can gauge performance in a recording system in this way: what happens when we iterate, dub the program over and over on the same system? If the tenth generation of a tape recording has hardly any more noise than the original, the recording system is doing very well indeed.

But that does not supply us with a standard for what is basically pleasing in the sound. Pleasing means, for one thing, that the "fake" coming out of the loudspeaker has some of the characteristics that make music exciting. For example, we can condemn out-of-hand the practice of a certain rock station in a very large city, where all program material is compressed down to 6 dB of dynamic range. The station has a large following mostly because there are hordes of rock-addicted teenagers in the city. They are being cheated out of a lot of the excitement in the music; rock does operate with a smaller dynamic range than many other kinds of music, but 6 dB is the route to claus-

trophia.

To understand the control of noise, we must get into psychoacoustics. There is correlated noise, which rises and falls with the program amplitude, and there is uncorrelated noise, which has no such relation to the program material. Both kinds depend on masking by other sounds, usually the program, for removal from the listener's ear. It is important to remember that a masked sound is not just obscured, but eliminated totally from human consciousness.

As dynamic range increases, the perceptibility of noise and distortion increases. This is one of the penalties the human hearing system imposes on our efforts to improve systems. Widening the frequency band also increases the perceptibility of noise and distortion. But if distortion is lowered (with no change in noise level), the noise may become evident; masking by the distortion has been removed! And the converse is true; all these factors are interdependent because of the way masking operates in the human hearing system.

Thus we have the paradox that if we reduce noise and distortion, we may hear more noise of another kind. The better you make it, the better it has to be.

What are the significant effects that get more obtrusive when we improve dynamic range or frequency response in a processing system? Modulation noise, correlated noise, is added by any non-linear system. We dislike it because it's not found in live music. The sideband noise of intermodulation distortion adds a "grit" that destroys the integrity of formants, the harmonic structure.

Transients get "stretched" by the frequency-dependent storage of energy, and formants again get "smeared."

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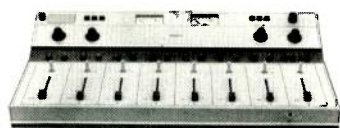
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Most horrible to the ear is frequency modulation, often the result of flutter in a turntable or tape machine. Again, it is an effect that doesn't exist in nature, and the human hearing system is offended by it.

As to frequency response, we know now that when performance is greatly improved in other respects, the traditional 20 Hz to 20 kHz bandwidth is not wide enough. The system must deal with out-of-hearing-band components. At the high end, a modern phono system, for example, may pick up from the disc occasional components up to 60 kHz that are only 10 dB down from the mid-frequency level. The preamp needs good performance to 60 kHz to avoid being driven into non-linearity.

Similarly, at the low end heavy subsonic signals can drive the system into non-linearity. A loudspeaker cone moving in and out at "visible" rates is a prime source of offensive frequency modulation; the ear is most sensitive to flutter of around three to four Hz. Cut-off filters, often used to control out-of-band signals, bring their own set of problems. As energy storage devices, they introduce distortions of their own.

The lesson is that if noise is to be lowered, all these forms of distortion must be brought very low, too; they will no longer be masked by the noise. And again, we note the converse. With distortion lowered, we must get the noise down. There are no "minor" changes, worth making independently of all other aspects of performance. That is one big reason why we can't stick some magic box into the audio line and get a splendid new audio quality. The whole system has to be treated, and the human perception system served as a whole, too.

We can take it for granted that the techniques are

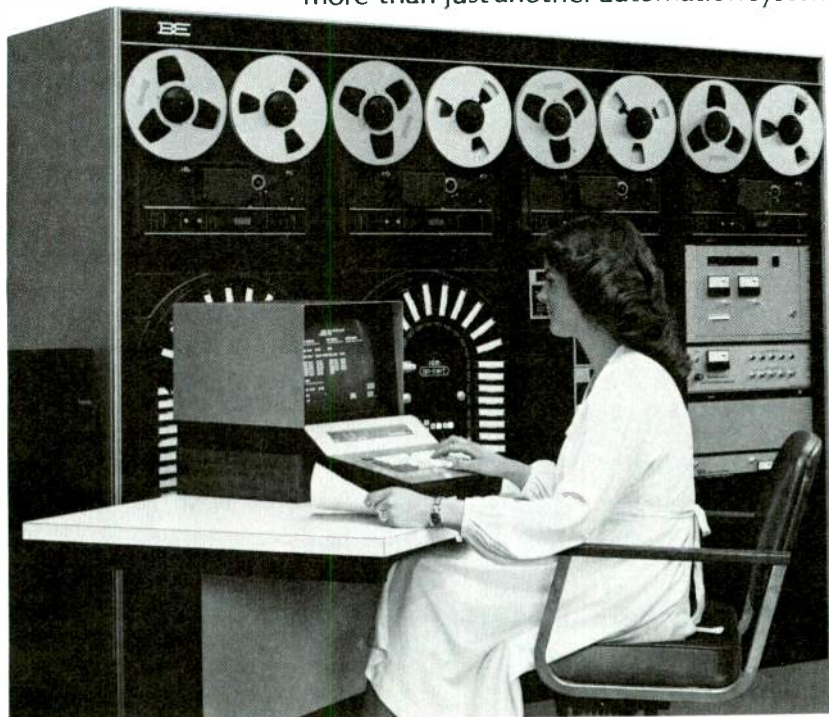
available today to get noise and all other forms of distortion very low indeed throughout a broadcast plant. There are still a number of difficulties, but the art is advancing rapidly. The main question for any broadcaster is, will it be worth it?

The broadcaster has to consider who his listeners are and what kinds of receiving equipment they have. But that emphatically does not mean, in this writer's opinion, that he should pitch his quality to the *lowest* receiver quality that is widely available: This has been done too often in the past. He must recognize the fact that quality standards are moving ahead rapidly throughout broadcasting. If he pitches low, he is liable to be left behind by his audience and, most disturbing, by his competition.

The only sensible answer is to be an order of magnitude *better* than the mass of listeners, with a plant that is open-ended to further improvement as industry standards go up — particularly as the mass of receivers get better, as they are surely going to do. For example, for station WNCN in New York, this writer specified, as consultant, a dynamic range of 70 dB because the majority of the hi-fi systems used to hear the station run around 50 to 55 dB. [Editor's note: See *BM/E*, March, 1978 for the WNCN story.] With some effort, the station could find another 20 dB of dynamic range. The art is becoming highly resourceful for advances of this kind. It is possible today to broadcast something far better technically than anything we have known in the past. So, returning to the opening question of what noise standards we should shoot for, this author answers that most broadcasters should get dynamic range up at least to hi-fi levels of 40 to 50 dB, and should be looking ahead to better than before too long. **BM/E**

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# The Lowly Dial-Up Telco Network Gets A Big Boost From Low Frequency Extenders

Audio quality is up in general, and it's good to know that even weakest link in the chain — the dial-up telco network — has received the attention of technologists and is now capable of providing a high quality link suitable for many broadcast needs.

RADIO STATION KZAM, BELLEVUE, WASHINGTON, is using a low frequency extender to deliver its World Team Tennis broadcast of Seattle Cascades action. Mutual Broadcasting System is using low frequency extenders for many of its sports programs and is encouraging its affiliates to check out the system for their own use. CBS Radio is using low frequency extenders for its Washington to New York telco link and NBC Radio has just completed testing one that it used to cover President Carter's trip to Panama.

What we are witnessing here is the introduction of the right device at the right time. Comrex of Sudbury, Massachusetts is currently riding a good crest of sales of its LX line of low frequency extenders, but admits that it is probably just a matter of time before other manufacturers enter the market with similar devices.

Though other devices have been on the market for some time to help alleviate the poor quality of the telco system, they have used notch filtering techniques which create their own set of problems by sacrificing another portion of the audio spectrum to retain the low frequencies. The basic problem in the dial-up telco system is that it is limited at the high end, offering little more than three kHz, and it has a sharp roll-off at the low end, losing almost everything from 150 Hz on down. The problem is worsened if the line is routed through carrier equipment where the cutoff will begin at about 350 Hz.

As Jim Stevens of KZAM points out, "It's amazing how impressive the low end octave you gain [with the extender] really is. Your loss between five kHz response and three kHz response really isn't as great in terms of octaves as loosing 300 cycles at the low end." KZAM uses the low frequency extender on telephone dial-up lines for away games and even on its broadcast grade line for home games. For the away games, the two announcers who do the games carry all the necessary equipment in two cases. When they arrive in the city where the game will take place, they meet an engineer from the Robert Wold



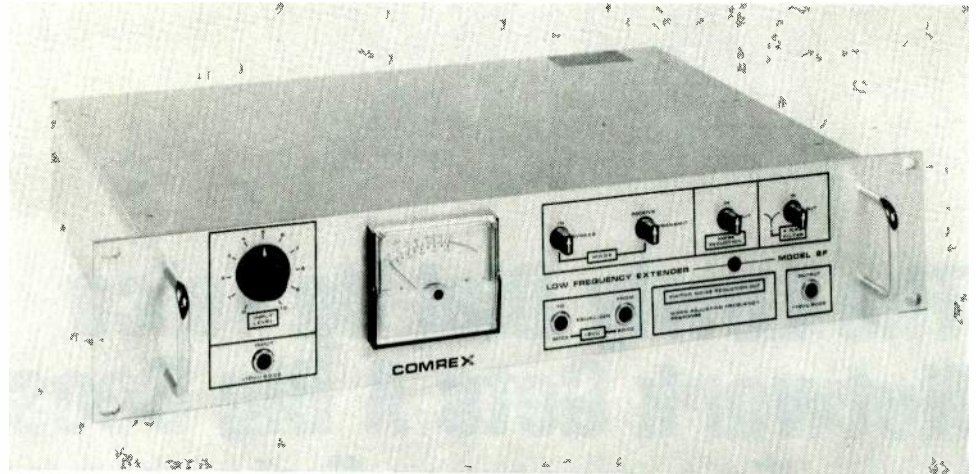
*The PLX model weighs just three pounds. MBS intends to equip several of its correspondents with the units to improve the quality of telephoned reports*

Company who does the actual set-up. The cases contain microphones for the announcer, a wireless Comrex microphone for use at courtside (both for interviews and for pick up of ambient sound), a Shure mixer, and the Comrex LX Extender.

The total system includes an encoder/transmitter at the input end and a decoder/receiver at the station end. There are several models, including both rack mounted and portable models. Mutual Broadcasting has been experimenting with both types and has discovered some interesting things. According to Ray Rask, director of engineering for Mutual, network vice president of engineering Bill Wisniewski discovered that the best way to use the Comrex system for taped feeds is to play the tapes into the system at half speed. At the receive end, the encoded signals are recorded, after decoding, on a tape recorder also operating

# Low Frequency Extenders

The 2F low frequency extender is both a transmit and receive unit. The system is available with dbx noise reduction, which MBS spokesmen say is a great advantage when transmitting at half speed



at half speed. When played back at full speed, says Rask, "it generally simulates about a 4.5 kHz line and gives our stuff the presence that you often lose with low frequency extension."

Rask is also very pleased with the ruggedness of the portable units. "Our sports crews pretty much destroy just about anything you put into the field, and both of these units have come back unscathed."

The half speed mode that Mutual has been experimenting with is most impressive over local loops, according to Rask. Rask says that some people have sworn that they

were using eight kHz lines. On long distance loops when signals are routed through multiplex gear, the results are not quite as dramatic, but are excellent, nevertheless. The half speed method does cost something in terms of signal to noise, but the units are equipped with noise reduction which provides about a six to seven dB improvement. "You have to watch the levels at the high end when using the half speed technique," says Rask. To improve the signal to noise situation, Mutual has also been using a low pass filter to counter the line noise they start picking up at

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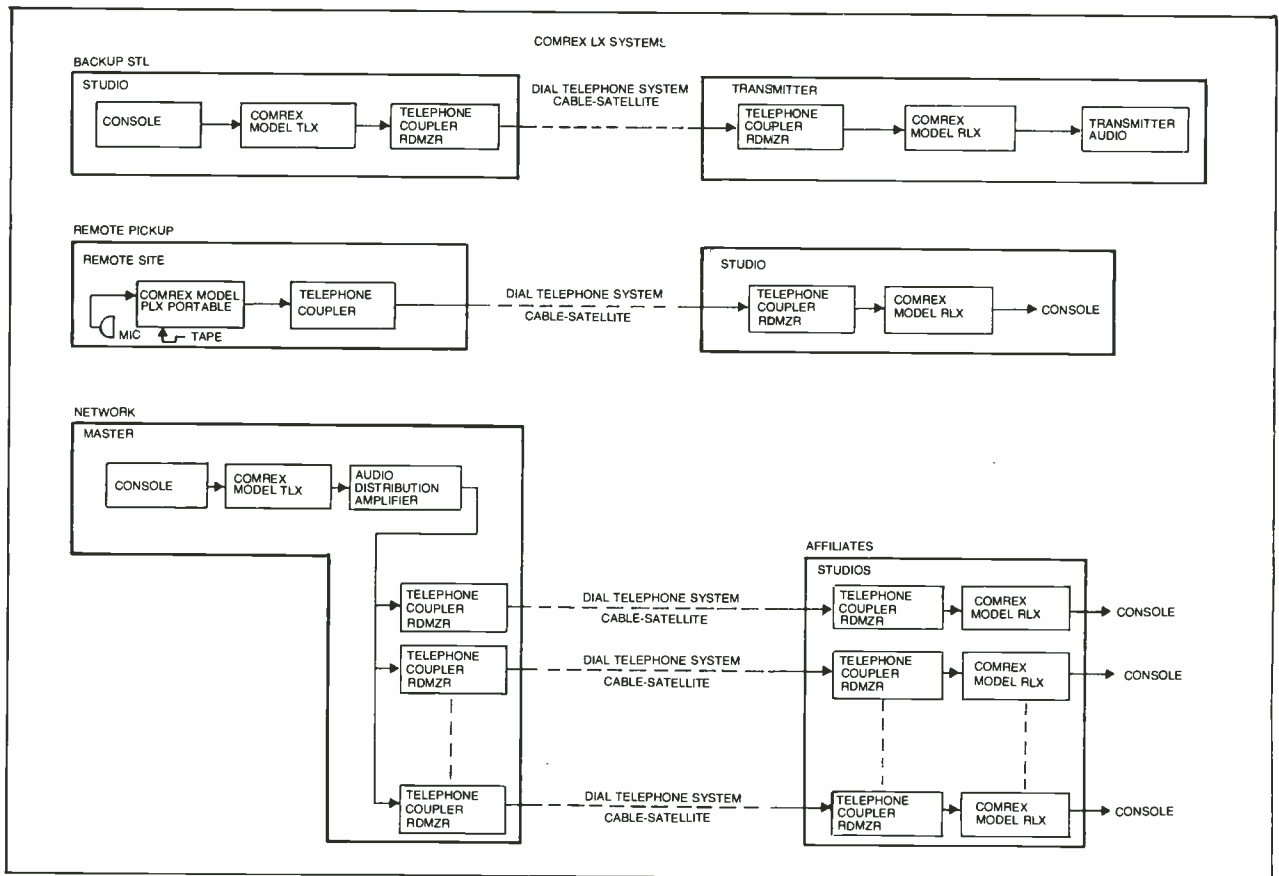


Diagram shows typical setup of low frequency extenders in various applications



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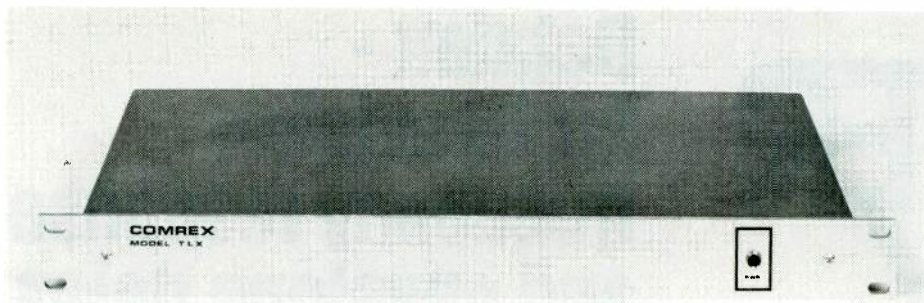
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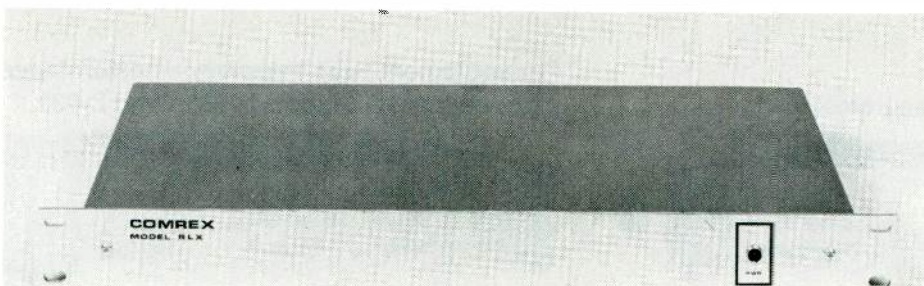


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## Low Frequency Extenders



*Model TLX is the transmitting encoder designed to encode the output of a console for transmission over dial telephone, microwave, satellite, and cable circuits*



*The Model RLX is the receiving decoder for the TLX, (and 2F, and PLX encoders). It is designed to receive the encoded signal over the same circuits as the TLX*

about 5000 or 6000 cycles.

The portable units are simple to operate, and Mutual expects to purchase quite a number of these units for their field correspondents. The reporter does not have to be technically proficient to use the unit, which weighs just under four pounds and has an XLR connector for a microphone. The output connectors are phono type and the reporters use alligator clips to connect the output to the leads in the telephone mouthpiece. The connection takes just a few seconds.

Mutual is anxious to get the units into the field. They intend to send one transmit/receive unit to their Reuters bureau in London, and would like to get additional units for some of their other overseas operations. They are also encouraging the larger Mutual affiliate stations to look into the extenders so that they'll be able to improve the overall quality of their affiliate news feeds. The low frequency extenders will benefit any communication link with poor low end response, including certain satellite, microwave, and cable links.

Stevens says that the low frequency extender will play a role in much of KZAM's programming — not just the tennis matches. KZAM's FM sister has one, and Stevens feels that it will make doing musical remotes practicable for the station. "It's still limited, but at least it brings doing music into a reasonable range where it can be considered." Though Stevens feels that the device is too expensive at nearly \$2000, he admits that it is probably expensive to manufacture. "There's a lot of circuit work in there and laser trimming involved . . ." said Stevens, "and they're well built." The prices the units are getting

range from \$895 for the TLX and RLX models to \$995 for the portable model and \$1995 for the transmit/receive LF model. Such a price schedule has not seemed to deter many customers, and the new higher prices which will soon be announced are not expected to deter many more.

The units improve the low end frequency response by shifting the input signal upward by 250 Hz. Thus, 50 Hz becomes 300 Hz, 1000 Hz becomes 1250 Hz, and so on. At the receive end, the output signal is down-shifted by 250 Hz so that signals coming in at 300 Hz are now 50 Hz and so on. This is done across the entire spectrum so that program material fed into the 2F, PLX, or TLX emerges from the RLX exactly as if it had been transmitted over a circuit whose frequency response extended to 50 Hz.

Fred Barbieri of WCBS Radio in New York, which is using the LX extenders on the New York to Washington link, said that though they have not yet done the testing necessary to document the device's performance, so far it seems to be doing what it claims, and doing it well. Other units are in use by NBC and ABC as well as the Texas State Network and numerous other outfits. Comrex reportedly has its hands full meeting the current level of demand, but is confident it can keep up with the orders. As with most good ideas, other manufacturers will probably be along with their versions in the near future. Even so, additional devices of this nature should prove a boon to remote pickup for radio stations around the country. As Jim Stevens of KZAM said, it's not just that the extenders improve existing facilities, but that they open up the opportunity to do a lot of different types of programming that would have been unthinkable not too long ago. **BM/E**

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# Banish Listener Fatigue And Hold On To Your Audience

By Harvey Rees

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Many stations have found that being louder than everybody else in town is not always the way to win friends and hold audiences. Getting the fatigue factors out of the signal has turned out to be a good way to do it. An expert in the field describes some of the main audio and RF design criteria for a low-fatigue signal.

---

MANY A MANAGER OR PROGRAM DIRECTOR hops in his car and punches all the stations in town on the car radio — and has a fit if his station is not the loudest. What he doesn't do is listen to his station for some time. If he did, he might find out why his quarter-hour maintenance is low. What he has to learn is that the average listener does not check all the stations in town to find the one that's loudest, and reject all the others.

From my own experience, I can project how it actually happens that a station is tuned out. Many times when driving between cities I have noticed an interesting phenomenon. A recording that I normally enjoy is intolerable when broadcast by certain stations. The urge to change the station comes when I am about 30 seconds into the recording.

What causes this urge? One of the prime sources of this acute listener fatigue is, in my experience, very heavy compression. Other contributors may be high noise, seriously unbalanced frequency response, or high distortion. In this article I want to set out some general guidelines for minimizing listener fatigue, first in AM stations and then in FM. This does not mean that you have to abandon a reasonable loudness, but that it has to be carefully engineered to combine with low listener fatigue.

Effectively reducing listener fatigue by careful treatment of the whole broadcast plant does have dramatic effects on audience appeal. Two of the stations where I have seen this take place recently are WLUP in Chicago and KISW in Seattle. [Editor's note: See "Radio Programming and Production for Profit" in this issue for a story on WLUP's successful new AOR programming.] I was personally involved in the "clean up" at WLUP; an engineer friend worked on KISW. In both cases, ratings went up sharply after the freshened signal got on the air.

In attacking these problems we have to remember what has often been pointed out, that a broadcast plant is a *system*, with every section interacting with other sections. To get after listener fatigue we must work through the whole system — audio line, processing, STL (if any), transmitter, antenna.

---

**Harvey Rees** is a consulting engineer with Carl T. Jones Associates, Falls Church, Virginia.

In AM the audio must be impeccably clean, flat, and noise free, not only out of the on-air console *but also out of the production studio*. Any rise in low frequency response, for example, is equivalent to a comparable loss of high frequencies. Consoles of superb quality are now available, but simply buying such a console is not the whole story: it must be integrated into the whole system, with proper headroom at all inputs and outputs, reactive loads controlled to avoid distortion, etc.

The design and operation techniques for top-grade audio are now widely understood, but I still frequently encounter certain practices that degrade audio performance. Incorrect tape machine bias is one: the bias should be set as high as it will go, without rolling off the high frequencies too much, *on a particular kind of tape*, and that tape should then be used exclusively. Tape cartridges need very careful maintenance, a special quality-control system. Cartridges as they come off the air should be put in a box for inspection by a person designated for the job. He must check the mechanics of every cartridge before it goes back into use. He should also run a frequency response check, preferably with three tones (100 Hz, one kHz, 10 kHz), to prove out alignment and the overall quality of the cartridge.

High rumble in a turntable can be a disaster. The new turntables, like the Panasonic Technics, are excellent and easily eliminate this problem, especially when mounted on a separate concrete pedestal, and not on the operating desk. The best way to check out your turntable line is with the NAB test record. You can get the exact RIAA/NAB curve by adjusting equalization in the preamp.

Some of the new op-amp plug-in audio amplifiers have superb performance in frequency response, signal-to-noise ratio, and control of distortion. Many can be readily adapted to existing consoles (this is often a must for FM — more on that presently).

If the audio line has been made faultless, we can move on to the processing section. Here is where a lot of the destruction of audio quality takes place in AM stations today. The most important rule for anyone installing commercial processing equipment of the type available today is, *use restraint*. Heavy compression, as already noted, is a frequent cause of serious listener fatigue. Learn

continued on page 72



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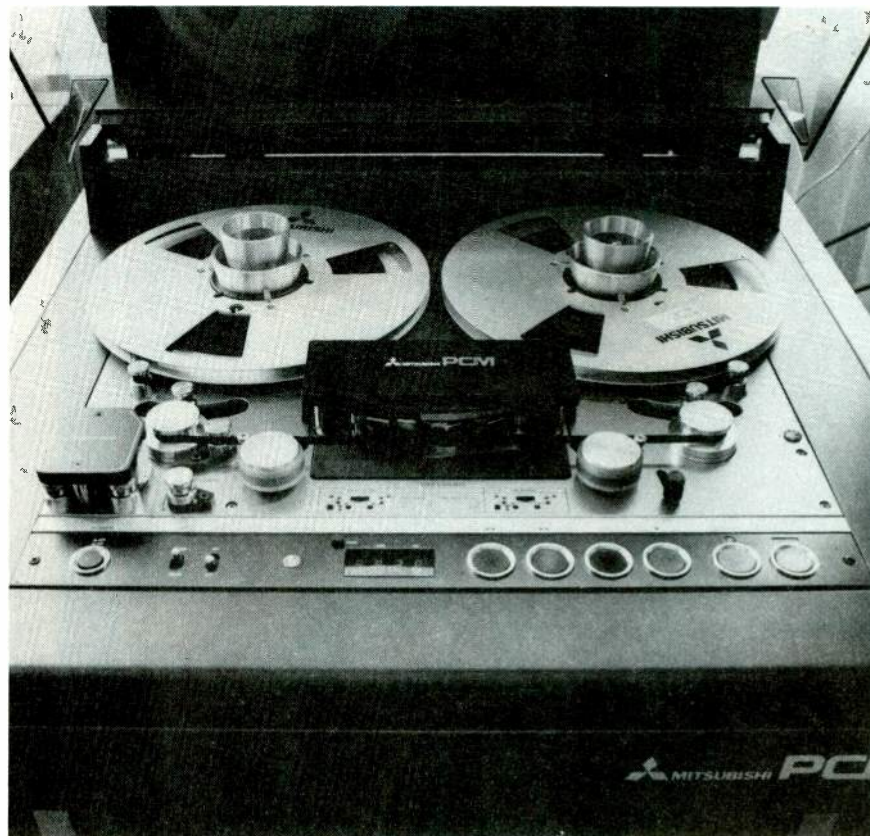
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## Banish Listener Fatigue

*Era of digital audio, which will help take listener fatigue out of the signal, is coming in with PCM tape systems from several manufacturers. At right is the Mitsubishi PCM machine*



everything you can about the pros and cons of the processor, what it will do and will not do, and most of all how it works.

The same rules apply to the peak limiter. A misunderstanding of the purpose of the limiter can be destructive. Do not use a peak limiter to compress the signal; that will produce severe loss of high frequency response and dynamic range. A peak limiter is a protective device and should be set only to keep very large peaks from overloading the transmitter.

Now we are at the transmitter, and every transmitter obviously has its own particular problems when it comes to noise, distortion, etc. Most one kW transmitters in use have hope, even old ones; it may take a lot of work, but in most cases they can be made to perform acceptably. Some older five kW and 10 kW transmitters are real dogs; others can be made to cook.

Obviously, the new breed of pulse modulated one kW and five kW transmitters have the potential for quality and loudness. But merely purchasing such a transmitter and installing it may lead to serious trouble. Let me expand on that.

Most old transmitters will work into pretty wide reactive load variations. Hang one of the new transmitters onto the load the old one had, and the new one may not work at all. For one thing, it may not modulate; or it may modulate very poorly. For another, the IM distortion may be as high as 15 percent.

This leads us directly to the importance of the antenna in audio quality, and specifically, the commonpoint load as seen by the transmitter. I find that some of my fellow consulting engineers dispute the importance of proper loading here, because of the narrow bandwidth of so many

current receivers. But the bandwidth of the antenna load sharply affects the operation of the RF amplifier. Obviously, if the load the RF amplifier is looking into is not proper, power cannot be delivered to the load — you cannot dissipate power in a reactance ( $I^2R$ , remember?). Thus, with a new transmitter the RF system usually must be gone through from transmitter to antenna to make sure the load is right. Various adjustment methods can be used in the tuning and matching networks to get the proper load for wide bandwidth, plus excellent modulation and distortion performance, essentials for audio quality.

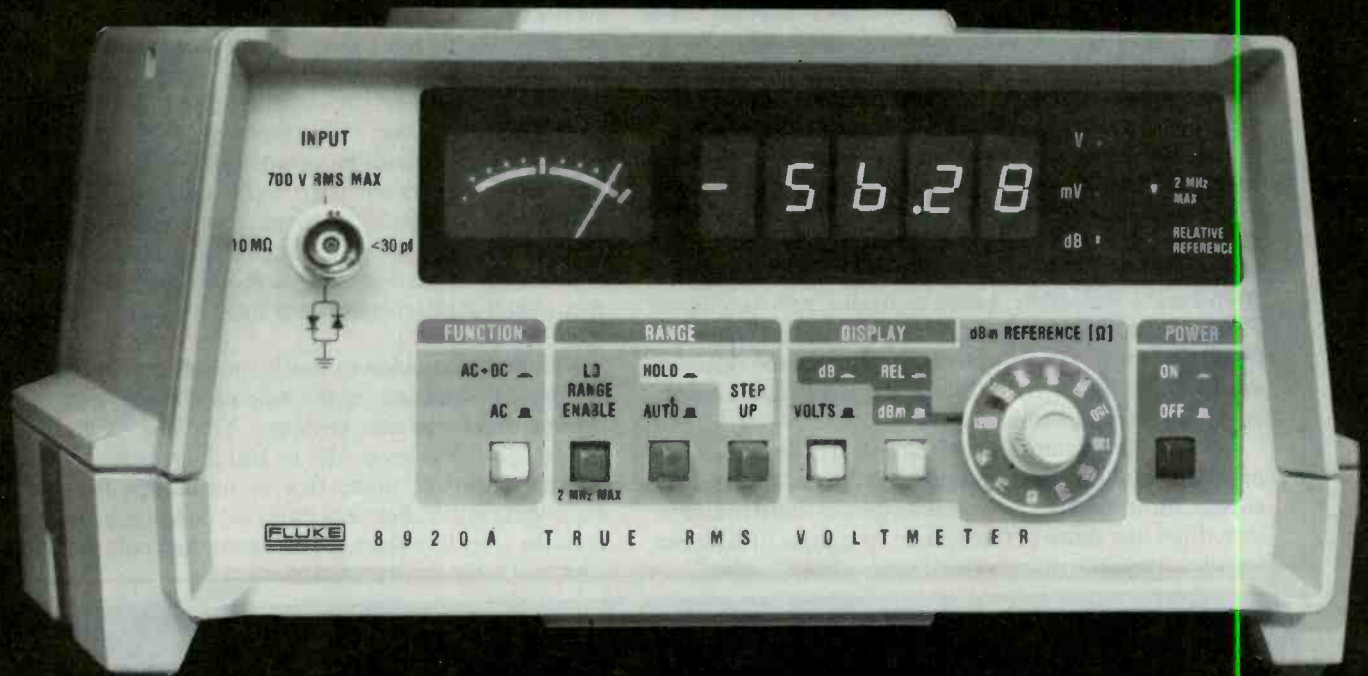
There is a final bandwidth pitfall — the tower itself. Small cross-section towers inherently have narrow bandwidth, as do highly reactive towers with steep reactance slopes. About the only way to deal with a small tower is to add surface area, usually in the form of wires spaced outboard or outside the structure, similar to a shunt-fed unipole (if windloading is not a problem). That produces a broad but still highly reactive load, so the matching networks must be adjusted to produce an optimum match while retaining the desired bandwidth.

This engineer has heard many explanations of poor audio performance, such as, “too much C in the antenna.” In my experience, in 99 cases out of 100, when the ideal match is effected between transmitter and antenna that part of the system will work well. The problem usually is that thoughts of audio stop at the transmitter — the audio chain, the consoles, etc., have been taken care of, but the system has not been considered as a whole. Working through difficult antenna matching problems may mean hiring a consulting engineer, and the management naturally has to decide whether or not the outlay of

continued on page 74



# THE WIDEBAND RMS VOLTMETER ONLY FLUKE COULD CREATE.



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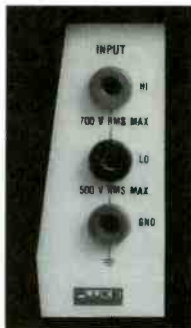
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An analog meter is standard, for convenient peaking/dipping/nulling, as is a linear analog output for continuous recording. Optional are logarithmic analog output and an isolated output to drive a counter. Soon, IEEE 488 interface will be available for systems use.

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## Banish Listener Fatigue

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With the advent of AM stereo, phase linearity and side-band load will become important antenna issues. We have designed several phasors for optimum bandwidth that proved to have 30 kHz flat bandpass, and are presently building a five-tower, 50 kW phasor for optimum side-band load, for AM stereo tests in Canada.

Now I want to address some of the fidelity problems in FM broadcasting. In reel to reel tape equipment, tape cartridge equipment, and turntable systems, the rules are about the same as in AM radio, except that phase error between the two channels is an additional burden. Keeping the two channels in phase in stereo cartridges has been discussed a great number of times in this magazine. Extremely careful maintenance and adjustment are essential.

Noise is extremely critical in FM broadcasting. Settle for no less than the absolute maximum signal-to-noise ratios in your amplifiers. Believe it or not, impeccable noise figures are not overly difficult or expensive. Currently there are at least three brands of plug-in amplifiers, from Pacific Recorders, Modular Audio, and Automated Processes, that have from -127 dBm to -129 dBm equivalent input noise. Outputs are +27 dBm and the response deviates only about 1/10 dB over the whole audio range. And others reach similar levels.

With just three amplifiers of this quality, one for microphones and two as program amplifiers, plus a small power supply, most standard consoles can be converted to almost incredible low noise performance. At a price of between

\$100 and \$130 for these amplifiers, the cost of extremely low amplifier noise is most reasonable.

As in AM, distortion in any link of the audio chain must be tracked down and the cause identified: lack of headroom, inherent high harmonic or IM distortion, etc. Here is an example of a particular kind of audio distortion that is fairly common. There is a station in the Washington area with excellent AOR programming, but the music goes very muddy on bursts of high frequency energy. This is typical of slew-rate related distortion produced by the type 741 and 709 op-amps, noticeable in several consoles currently on the market.

Moving on to the STL: I have found high distortion in a number of cases that came from hitting the STL too hard. All STLs should have some form of AGC to protect them. It is therefore advisable to have your compression, moderate in amount, ahead of the STL.

Telco lines are also often a problem, especially because of the poor amplifiers often used in telco work. I know one engineer who ordered telco loops into a theater about halfway to his transmitter. He put equipment in the theater to equalize and amplify the telco lines himself, and did it again at the transmitter. This is obviously an extreme case, but it highlights the need for some care when using telco STLs.

Serious degradation of quality in FM can be caused by hanging the antenna on the side of a tower, and many stations have had this problem. You can hardly avoid pattern distortion over 135 to 150 degrees of arc if the antenna is on the tower face or on a large-faced self-supporting tower. For very little cost difference, the tower could be sixty feet shorter, and a sixty-foot pole put on top

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to carry the antenna. Then the antenna can be designed and field tuned for distortion-free performance.

Another frequent source of distortion in FM is the use of many, many antenna bays. This is of course the way to get high power on the air with a minimum investment in transmitter power. But it often has the drawbacks of serious multipath, deep nulls close to the transmitter and extreme "picket fencing."

The FM management can trade off these problems with an increase in transmitter power that allows a reduction in the number of antenna bays. A good approach is to put in two 20 kW transmitters; then you will also have a "hot spare" to keep you on the air at all times.

Now let's return to the purpose of all these design efforts — pleasing and *holding* the listener. The listener who tunes in a station and stays with it most of the day is the kind of listener every station needs. If you have this listener in an automobile, he will stay with you during the morning drive, and your station will still be tuned in when he hops in his car to come home. You can't get this kind of listening purely with loudness. The widespread belief in loudness among both AM and FM managers has little backing in real life. The very high compression that goes with extreme loudness is, in fact, a main factor in the "fatigue" that often drives the listener away. Nor can multipath distortion be driven away by loudness, as many FM managers believe.

Very high levels of compression are often accompanied by weakness in high-frequency response, with resulting lack of clarity. Remember, your biggest competitor for the listener's ear is often his home hi-fi system. Your radio sound must not have less clarity or lower overall quality

than the home record player.

However, as I have noted, a moderate amount of compression is desirable, partly to keep the listener's hands away from the radio: you want to avoid frequent resetting of volume, which leads all too easily to retuning. So use compression, but be very careful with it.

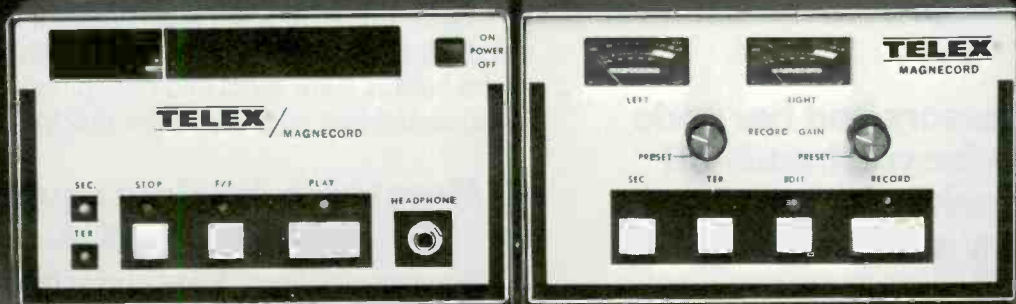
Sibilance, splashy "esses" from an excess of mid-high frequencies, is another irritant. Agency tapes and discs are hard to control for this and other distortions, but complaining does help sometimes. An equalizer in the production room can help, too.

My plea to any station manager who disbelieves any of my advice is to gamble for one "book" on these directions for best sound, and watch the trend in quarter-hour maintenance. I have seen the proof a number of times.

Beyond that, the state of the art is changing very rapidly. Audio and radio are getting more sophisticated every day. Digital control is with us now, and digital recording and processing are just around the corner. Satellite transmission is opening up a new era of live 15 kHz stereo concert broadcasts. The engineer must constantly educate himself in these new areas or fall behind. Even a knowledge of music — how to read it, what frequency is a low E, the frequency spans and relative energy levels of various octaves — is most handy for the engineer.

Some of the engineers who said that transistors would never replace tubes, and refused to learn the new technology, seem to be still hanging in there. One asked me not long ago if I did not really believe that tube amplifiers sound better than transistors! How will this holdout survive as an even later revolution, the wave of ICs, takes over more and more?  
BM/E

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The TCR-100 and TCR-100A cartridge recorders have made programming easier for more than 200 TV stations—and now the “cart” from RCA is better than ever.

As you may have seen at NAB '78, we've added a microprocessor-automated programmable random play option. Now, the “cart” can deliver automated station breaks with even greater ease.

## **Microprocessors and bar code labeling give you hands-off station breaks with improved accuracy and simplicity.**

The TCR-100A holds up to 22 cartridges, each containing up to 3 minutes' worth of spot or program material. With the automation option, the carts are bar code labeled for instant identification. They may be placed in the TCR-100A at random, wherever there is an opening. Microprocessors, communicating with your station's central computer, select and program cartridges in their correct sequence, automatically. If last-minute changes are needed, they can easily be made. And the TCR-100A may be manually operated as well.

## **The “cart” is really a workhorse.**

The basic TCR-100A fills many programming needs. Material is dubbed onto cartridges just once, regardless of the number of airings. There's no daily spot reel to assemble and break down. So, the “cart” frees a reel-to-reel VTR and its operator for profitable production duties.

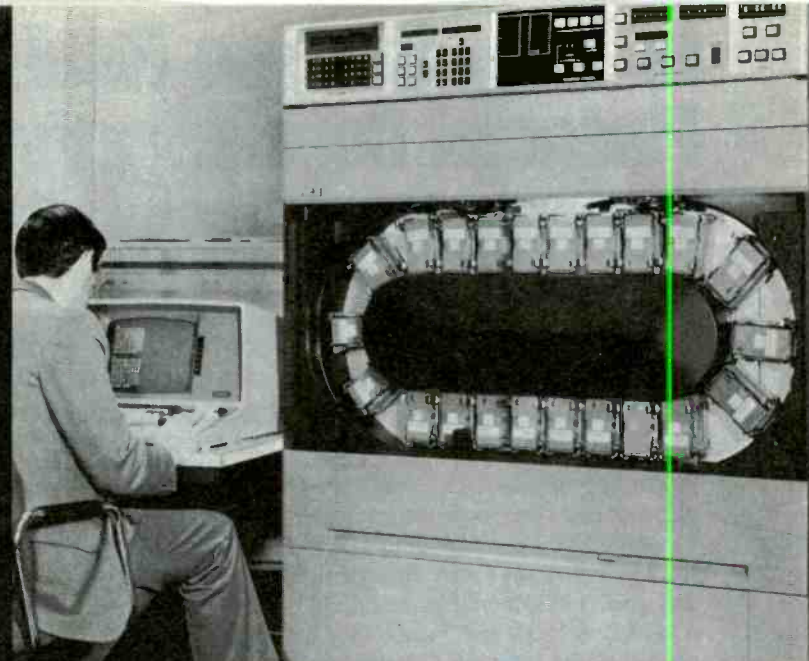
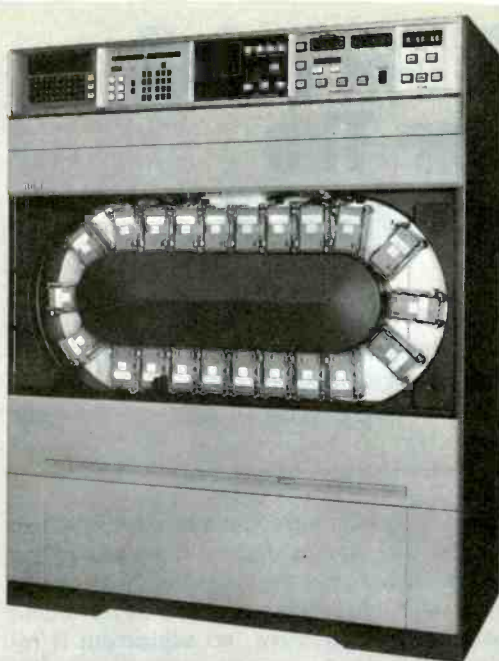
Since the TCR-100A is an operator-oriented machine, cartridges can be made with the press of a button. Film spots and reel-to-reel material can be dubbed onto cartridges quickly and easily.

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# **RCA**



**The automatic TCR-100A.  
Part of the new video freedom.**

# Is That Station Really A Bargain? Financial Considerations For The Prospective Station Owner Part II

By David E. Schutz

At some point in his career every broadcaster considers purchasing his own station. This is the second half of an article which examines the economic and financial considerations that should be made by every prospective owner of a broadcasting station. Part I appeared in July, 1978.

IN THE JULY ISSUE AN EXAMINATION WAS PRESENTED of the external factors that influence the operations and hence desirability of a station. The topics included the local market's economic characteristics and the quantity and quality of competing media. All of these factors are regarded as "external" since they are beyond the direct control of the individual station owner.

Attention will now focus on an analysis of the station's "internal" operations. This is an area where the owner can exert a great deal of control. The efficiency of the internal operations will be compared with industry averages, and the entire analytical process will culminate with the formulation of revenue and cash flow projections, and a possible loan repayment schedule.

## Conservatism and business analysis

Business analysis is based upon conservative tenets. Such conservatism tends to place greater emphasis on the potential negative aspects of a station's operation than on the positive ones. This tendency will become readily apparent when you start to handle the questions of potential financial backers. Remember, if the purchase of a station looks attractive using conservative financial projection, think of the acclaim you will receive if you can outperform them!

## Financial statements

Financial statements are the most objective measurement of a station's viability as a business. Even if you have never had an accounting course, your serious search for a station will make you reasonably adept at reading them.

The most important financial statement for the prospective owner is the income statement. Because of the need for correct interpretation of the information it contains, a review of its basic elements, and commonly made "adjustments," is in order.

The income statement consists of two parts. The first, termed "revenue," shows the source and quantity of funds flowing into the station. The second is termed "expenses" and shows the funds that flow out of the station in order to support its operations. The difference between revenues and expenses represents "income" (profit).

Figure V is the summarized income statement for WDES, the hypothetical station that was used in Part I of this article. The figure also contains a column labeled "After Adjustment," which contains the figures that will be used to calculate "cash flow." Now let's examine each of the major items that comprise the statement:

**Advertising Revenues.** This is the total revenue derived from the sale of commercial advertisements and programs

on the station.

**Other Income.** This item can contain revenue from two types of sources. The first is derived from production services and similar activities that are directly related to the station's routine operations. Since a buyer would expect to continue these services, no adjustment is required.

The second type of revenue that can appear in this item arises from interest and investment income. This would include interest paid by a bank on a savings account. Such income is incidental to the operation of the station and should *not* be included in the analysis made by a prospective buyer. Reference to Figure V shows how such income has been eliminated.

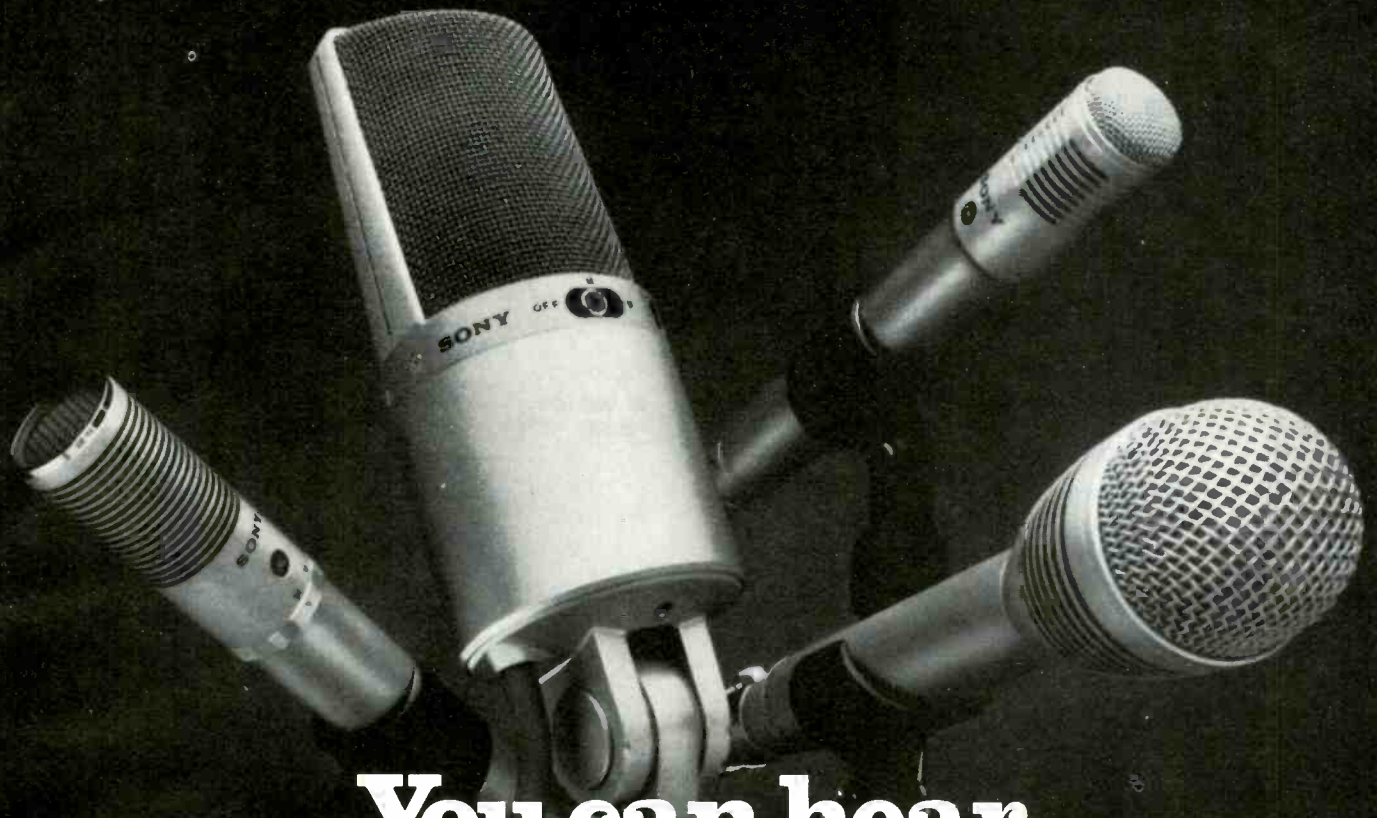
**Agency and Representative Commissions.** These are the fees charged by advertising agencies for the placement of commercials on the station and for the services of sales representatives who secure regional and national advertising. Accountants term these items "adjustments to revenue" and place them in the revenue portion of the income statement. When they are subtracted from total or "gross" revenue, the difference is termed "net revenue." This figure represents the actual monetary inflow to the station. Because the amount of advertising handled by agencies varies among stations, revenue comparisons are normally made on a net basis.

## Expenses

The "revenue" portion of the income statement shows the amount of money that flows into the station. The "expense" portion shows how some of it (hopefully not all) flows back out to pay salaries, utility bills, and other commodities required for the station's continuing operation. Normally, expenses are classified into one of four categories in accordance with the accounting guidelines normally used in this industry. These categories are: technical, program, selling, and general and administrative. While it is possible to make detailed comparisons of the size of these items vis-a-vis industry averages, an explanation of how this is accomplished would extend beyond the space available here. A prospective buyer will have to use his intuitive judgement to decide whether expenditures labeled as technical, program, and selling are reasonable.

Normally, the general and administrative classification contains the largest number of questionable items. One of the first to look for is interest expense. This represents the interest paid by the station for the use of borrowed money. Since every station will have a differing level of debt, and therefore interest charges, this item must be eliminated if meaningful comparisons are to be made between stations. A discussion of station financing and loan repayment will

continued on page 80



# You can hear the difference because the difference is right here.

Take a look at what's taking the industry by storm. The Back Electret, another giant step forward from Sony.

Never before has it been possible for thin polyester film to be used in electret condenser microphones. That's because polyester film, acknowledged as the best material for microphone diaphragms, just can't hold a static charge for a long duration.

But Sony's engineers have made the impossible, possible. They've found a way to adhere the electret material directly to the back plate of the microphone. By thus putting the charge on the back plate, we are able to use polyester film in the diaphragm.

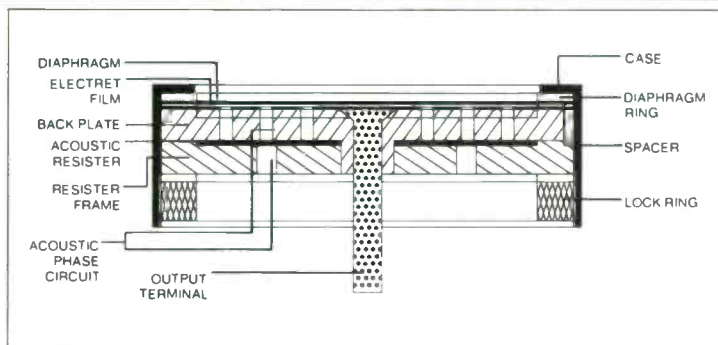
The result will be obvious to your ears. Clearly superior sound quality, without particular color-

ation in the upper frequency range. The low mass diaphragm means better transient characteristics over the entire frequency range.

You can find the Back Electret in four Sony microphones: ECM-56F, \$220; ECM-65F, \$210; ECM-33F, \$165; and ECM-23F, \$100.

But you don't have to look at Back Electrets to see why Sony is ahead.

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Sony's microphone line is thoroughly complete. It ranges from professional condenser to semi-professional to microphones for public address, vocalists, and outdoor use. There's omni and uni-directional. And we think it's big of us to make sophisticated

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# SONY AUDIO

## Financial Considerations Part II

**Fig. V**  
**Summarized income statement, radio station WDES**  
**For the year ending 197X**

(Includes adjustments required to derive broadcast "cash flow.")

	<u>Before Adjustment</u>	<u>After Adjustment*</u>
<b>Revenues</b>		
Advertising Revenues	\$179,000	\$179,000
Other Income		
Production Services	\$1,000	\$1,000
Interest	5,000	-0*
Total Other Income	<u>6,000</u>	<u>1,000*</u>
Gross Revenue	\$185,000	\$180,000
Less: Agency & Rep. Comm.	(5,000)	(5,000)
Net Revenue	\$180,000	\$175,000
<b>Expenses</b>		
Technical Expense	\$12,000	\$12,000
Program Expense	54,000	54,000
Selling Expense	31,000	31,000
General & Administrative		
G. & A. Salaries	\$32,000	\$32,000
Corporate Aircraft Expense	15,000	-0*
Depreciation	10,000	-0*
Interest	11,000	-0*
"Other" G. & A. Expenses	<u>20,000</u>	<u>20,000</u>
Total G. & A. Expenses	<u>88,000</u>	<u>52,000*</u>
Total Expenses	\$185,000	\$149,000
Gross Profit (Loss) From Operations	(\$5,000)	\$26,000*
		Cash Flow

\*Denotes item that has been adjusted in order to calculate Cash Flow

be presented later in this article.

Another item that must be afforded special consideration is depreciation. Among all the items that appear in the income statement, this is the only one that does not represent an actual monetary transaction. Rather, it is an accounting adjustment that compensates for the wear and tear sustained by the technical equipment and other fixed assets during the year.

Your examination of the income statement is not complete until you scan it for any unusual expenses. Such items might include the costs for operating the present owner's personal airplane and vacation home. Also be on the outlook for any unusual "management consulting fees" that could really be payments to friends or relatives. Don't laugh — items such as these do appear from time to time. To determine the appropriateness of an item ask yourself, "Would I expect to make the same expenditure if I owned the station?"

Figure V indicates that before any adjustments were made the station showed an accounting *loss* of \$5000. However, if you owned the station free and clear and eliminated superfluous items, the amount of money coming into the station would have exceeded that flowing back out (cash flow) by \$26,000!

A term commonly used in regard to a station's financial operations is "cash flow." Like many other business

terms it has several connotations. The most widely accepted definition, and that which will be used here, is the pre-tax profit of a station restated so as to eliminate interest, depreciation, and non-broadcast expenses. Interest is excluded because, as mentioned earlier, it varies among stations and is unrelated to the viability of the enterprise's principle activity, which is broadcasting. Depreciation is excluded since it is a non-cash item and will vary widely depending on the age of the station's equipment and other factors. Income taxes are not considered since their effective rate can vary dramatically as the result of tax credits, losses carried forward, and similar circumstances.

### The cash flow margin

Armed with the station's cash flow, you can now start to analyze its internal operating efficiency as measured by its "cash flow margin." This is computed by simply dividing cash flow by adjusted net revenue.

$$\frac{\text{Cash Flow}}{\text{Adjusted Net Revenue}} = \text{Cash Flow Margin}$$

The quotient, which is expressed as a percentage, shows the proportion of cash flow that is derived from each dollar of net revenue. This figure is very useful when two different stations are to be compared. In such a situation, differences in the absolute levels of revenue and cash flow

continued on page 82

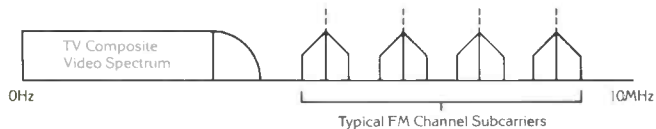


# Tomorrow's super sound. Today's super saver.

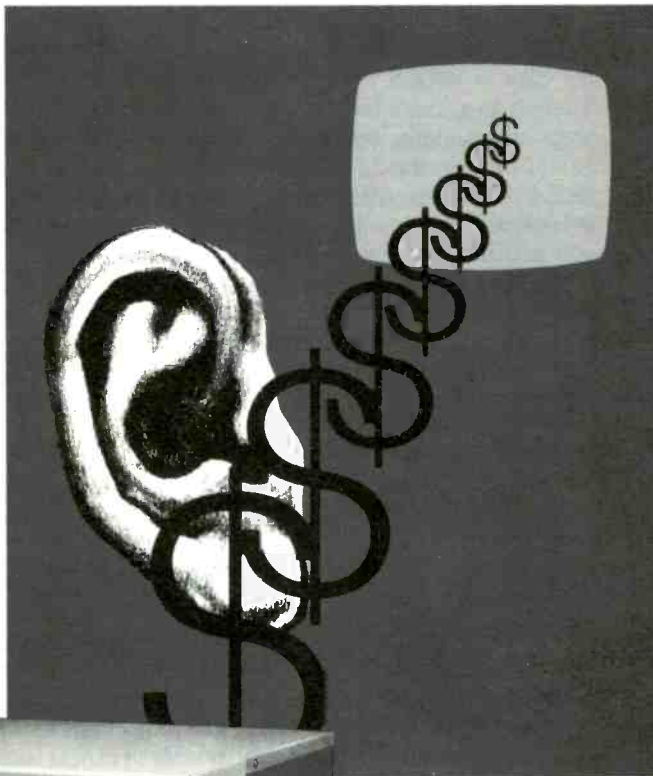
Farinon's new FV43-02 Audio Transmission Channel System is destined to revolutionize TV broadcasting. Because of this unique system, true high fidelity mono or stereo sound for TV can become a reality. And that's only the beginning.

Now by simply integrating the FV43-02 with your video transmission system, you'll realize an immediate savings in equipment costs, maintenance, and overall operations. That's because the FV43-02 eliminates the need for a separate TV audio transmission system. With your video, you'll transmit true high fidelity audio with low noise, low distortion, and a flat response to 15kHz. Superior to any TV sound you've ever heard.

Here's how it's done: The FV43-02 utilizes a portion of the spectrum immediately above the video for simultaneously transmitting/receiving up to five separate audio channels over an FM subcarrier frequency range of 5.8 to 8.59MHz. That means your video sys-



tem can not only handle TV stereo sound, but also a separate FM stereo broadcast station and a separate AM broadcast station simultaneously! How's that for flexibility and economy.



To prove its worth, more than 2000 Farinon systems like the FV43-02 are already in use by telephone companies for video/sound transmissions over microwave and cable. It's Bell-compatible and meets or exceeds CCIR and EIA standards.

With its standard interfacing, the FV43-02 is simple to install. And after initial performance checks, there are no controls to adjust. What's more, it's backed by Farinon's vast engineering experience and after-the-sale service.

For TV studio-to-transmitter-links and intracity relays, satellite transmissions, or head-end CATV, the revolutionary FV43-02 deserves to take a bow. Get in the act and find out more about tomorrow's super sound and today's super saver.

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## Financial Considerations Part II

could complicate comparisons. The cash flow margin simplifies the task since the station with the highest value is the most efficient, and, all other things being equal, the most desirable.

Unfortunately, the prospective station owner will encounter many stations that have only a negligible cash flow. How do you determine a reasonable cash flow margin for such a station over the long term? There is no easy answer to this question, since the profitability of every station is the result of its unique circumstances. In the case of WDES the cash flow margin is 15 percent. There is an average level for AM stations of this size. If it were substantially below this rate, additional research would be warranted. Such research would focus on an item-by-item analysis of expenses in an attempt to find areas where reductions could be made. It is crucial that you realize that there are stations with unalterably high levels of expenses and resulting low cash flow margins. Such stations can be sound purchases as long as the buyer recognizes that it will be difficult, if not impossible, to raise the cash flow margin and therefore tempers his financial projections accordingly.

### Formulation of operating projections

It is now possible to compile financial projections of the station's operations using the material that has already been assembled. The first step in the process is to project the market's total radio revenues. Normally these projections will be based on recent historical experience. Let's assume that after examining the past five years' data you find that the market's total radio revenues have been growing at a consistent rate, say six percent. Based on your analysis of the local economy and projections for the radio industry overall, it seems reasonable to expect similar growth in the future. It now is a simple exercise to multiply the market's present revenues by 1.06 to determine what they will likely be one year from now. That figure is then multiplied by 1.06 to estimate the following year's revenue, and the pattern is continued for as many

years as you desire. Figure VI shows how a six percent growth rate has been applied to our hypothetical market.

Next, you must make a reasonable estimate of the subject station's share of these revenues over the long term. It should coincide with the station's revenue, audience, and theoretical shares as discussed in last month's issue. In the case of WDES, it is reasonable to expect a continuation of the station's recent 11 percent revenue share. By applying this share to the market's total radio revenue, the subject station's revenues are derived.

The station's cash flow can now be estimated by using the cash flow margin. This normally reflects the station's most recent operating experience. If you are analyzing a station with a low margin, you should only increase it after you have completed an extensive examination of the station's operating expenses, as noted earlier. In the case of WDES, the present 15 percent level is expected to continue.

Figure VI illustrates how the projections are made for WDES. To eliminate any confusion, let's review the principle items and the way in which they were computed. The "WDES Revenue Share" was multiplied by "Total Market Radio Revenues" in order to derive the "WDES Revenues." These in turn were multiplied by the "WDES Cash Flow Margin" and produced the "WDES Cash Flow." A running total of the yearly cash flows is presented under the heading "Cumulative Cash Flow."

### Finally — evaluation of price!

When broadcasters discuss the sales price of a station, the topic of "multiples" will inevitably be heard. Statements such as "... every radio station is worth 2x revenues," will be uttered with apparent authority. The selection of a station would be immensely simplified if there were a single "multiple" that would yield the fair value of every station, but *it does not exist!* "Multiples" should not be used as the primary method of evaluating a station. They are a poor substitute for fundamental research and bargaining skill.

"Multiples" are useful, but they should be used to explain prices rather than determine them. In this role,

continued on page 84

**Fig. VI**  
**WDES projected revenues and cash flow**

(Dollars in thousands)

	Years								
	1st	2nd	3rd	4th	5th	6th	7th	8th	9th
Total Radio Revenues <sup>1</sup>	\$1,685	\$1,787	\$1,894	\$2,007	\$2,128	\$2,255	\$2,391	\$2,534	\$2,686
WDES Revenue Share <sup>2</sup>	11%	11%	11%	11%	11%	11%	11%	11%	11%
WDES Revenue	\$185	\$197	\$208	\$221	\$234	\$248	\$263	\$279	\$295
WDES Cash Flow Margin <sup>3</sup>	15%	15%	15%	15%	15%	15%	15%	15%	15%
WDES Cash Flow	\$28	\$30	\$31	\$33	\$35	\$37	\$39	\$42	\$44
Cumulative Cash Flow	\$28	\$58	\$89	\$122	\$157	\$194	\$233	\$275	\$319

<sup>1</sup>Projected to increase at the rate of 6% per year

<sup>2</sup>Continuation of the station's most recent experience

<sup>3</sup>Continuation of most recent experience, excludes interest, depreciation, non-broadcast expenses, and income taxes

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Never before has the broadcast industry been able to exercise more total control over remote operations. TFT Telescan now brings computerized digital control of up to 120 channels of remote functions with instantaneous accuracy.

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**CUSTOM SOFTWARE** is also available with the Telescan System. Socket-mounted nonvolatile memory EPROM may be replaced by factory order at any time with those containing customized software.

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## Financial Considerations Part II

“multiples” act as sign posts that denote the upper and lower ends of the range in prices being paid for stations. To illustrate, at the moment AM radio stations, such as the hypothetical WDES, are being sold at multiples that range from five to seven years of projected cash flow. In the case of small radio stations such as this, additional consideration is given to any real estate which would have significant value if the station were to cease operations. Let's assume that the value of such real estate at WDES is \$50,000. The asking price of \$250,000 would appear to be “reasonable” then since it is equivalent to about six years of projected cumulative cash flow. The term “reasonable” is used to describe the price because after deduction for the excess real estate (\$50,000), the asking price is in the middle of the range of prices (as measured in years of cash flow) that are currently being paid for stations of this type.

Should you buy this station since the price seems to be reasonable? This is a question that only you can answer, since the answer will be determined by the availability of other stations and your own subjective feeling about the station and its market.

### Thoughts about financing

First-time purchasers of radio stations frequently rely on borrowed money to finance their acquisitions. The money can either be provided by the seller or by outside lenders who specialize in financing stations. In most cases the cash flow from the station is used to service the debt.

Therefore, a crucial question for both you and the lender is whether the cash flow generated by the station will be adequate to cover the loan. The only way to answer this question is to construct a loan repayment schedule based upon our financial projections for the station.

Assume that you agree to purchase WDES for \$250,000. The seller agrees to lend you part of the money for the transaction. You will pay 29 percent of the purchase price (\$72,000) immediately in cash and will retire the balance of \$178,000 with the cash flow generated by the station. In return for the use of his money, you will pay the seller 10 percent interest on the unpaid balance of the loan.

Figure VII shows how the net cash flow from the station is used to retire the loan. The net cash flow is the cash flow available *after* payment of loan interest and income taxes. To avoid boring the reader with a detailed explanation of the accounting procedures used to derive the data, only its highlights will be noted. First, notice that interest and depreciation have been deducted from cash flow in order to determine taxable income. This is because both are deductible for tax purposes. Second, after the payment of income taxes, depreciation is *added* to net income to derive net cash flow. You will recall that depreciation is a non-cash expense. Therefore, the funds attributable to it are available for any use, including repayment of the loan.

At the bottom of Figure VII is information regarding the loan's balance at the beginning and end of each year. On the basis of the projections in the figure, the loan at WDES would be fully repaid by the end of the ninth year of ownership.

continued on page 86

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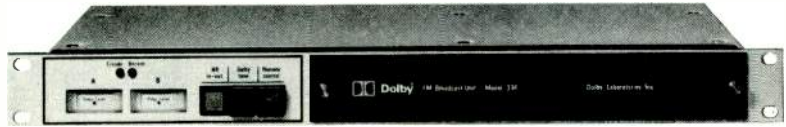
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One of our systems belongs in your station.

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# Good FM sound is good FM business.



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More and more FM listeners these days are sensitive to good sound. If you have any doubts, just take a look at the sales of quality home and automotive stereo equipment. For these listeners, *signal quality* could well be a significant factor in distinguishing your station from the run of the mill.

Signal quality is what Dolby FM is all about. The Dolby FM process incorporates a reduction of pre-emphasis from 75 to 25  $\mu$ s, along with B-type Dolby encoding. That gives you about 8 dB more headroom at 10 kHz — just the thing for today's program sources that are rich in high frequencies. Limiting can go back to doing what it was originally designed for — handling the occasional difficult peak — rather than filtering out the highs most of the time.

Listeners with receivers equipped for Dolby FM reception\* have the opportunity, for the first time, to recover your signal in virtually the same form it left the studio. Your FM signal can sound as good as the high quality records and tapes your listeners play at home. At the same time, listeners with conventional receivers aren't penalized, because 75  $\mu$ s de-emphasis subjectively complements the Dolby encoded 25  $\mu$ s signal for compatibility.

Attracting new listeners to your FM station is one thing; keeping today's sound sensitive listeners happily tuned in is another. That's where signal quality — and Dolby FM — come in. If you would like to find out more about how the good sound of Dolby FM can be good for your business, please contact us at the address below.

\*There are now more than 80 consumer product models equipped for Dolby FM reception, including several new car stereo systems.

**Visit Dolby at the NRBA convention, Booths 122-3,  
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**Circle 147 on Reader Service Card**

## Financial Considerations Part II

**Fig. VII**  
**WDES loan repayment schedule**

(Dollars in thousands)

	Years								
	1st	2nd	3rd	4th	5th	6th	7th	8th	9th
Cash Flow <sup>1</sup>	\$28	\$30	\$31	\$33	\$35	\$37	\$39	\$42	\$44
Less: Interest Expense	(18)	(17)	(16)	(14)	(13)	(11)	(8)	(6)	(3)
Depreciation	(10)	(10)	(10)	(10)	(10)	(10)	(10)	(10)	(10)
Taxable Income	0	3	5	9	12	16	21	26	31
Less: Income Taxes <sup>2</sup>	0	(1)	(1)	(2)	(3)	(4)	(5)	(7)	(8)
Net Income	0	2	4	7	9	12	16	19	23
Add: Depreciation	10	10	10	10	10	10	10	10	10
Net Cash Flow	\$10	\$12	\$14	\$17	\$19	\$22	\$26	\$29	\$33
Loan Balance — Start of Year	\$178	\$168	\$156	\$142	\$125	\$106	\$84	\$58	\$29
Less: Repayment	(8)	(12)	(14)	(17)	(19)	(22)	(26)	(29)	(29)
Loan Balance — End of Year	\$168	\$156	\$142	\$125	\$106	\$84	\$58	\$29	-0-

<sup>1</sup>From Figure VI

<sup>2</sup>Federal and state taxes have been computed at an effective rate of 25%

### Closing thoughts

This article has examined some of the basic economic and financial analyses that should be made by every prospective buyer of a broadcasting station. The techniques highlight the objective factors which influence the value of each station. When utilized by a buyer, they enable him to determine the reasonableness of the price being asked for the station.

Remember that the validity of the results obtained by these analytical techniques is only as good as the assumptions that they are based upon. There is no substitute for sound business judgement. Ultimately, your success as a station owner will not be determined solely by your ability to acquire a station at a low price. Instead, it will be determined by your ability to run *your station* efficiently and effectively!

BME

## It takes a lot of connections to be a success in electronic editing



IVC  
BOSCH  
AMPEX  
SONY  
JVC  
RCA  
3M  
PANASONIC

And that's one of the important reasons why Datatron's Tempo 76 editing system is so successful; Tempo 76 interfaces to more types of video and audio tape decks than any other editing system on the market. Field proven interfaces are available for over FORTY makes and models of tape decks, including Ampex, Bosch, IVC, JVC, Panasonic, RCA, Sony, and 3M.

But Tempo 76 hasn't relied on its connections alone to achieve success. Backing up those connections are Tempo's unexcelled editing abilities and innovative features. Features such as VaraScan slow motion/reverse/freeze-frame viewing; an expandable edit event memory; motion control and servo-sync of up to three VTRs; optional high speed punched paper tape and printer peripherals; a text editing option; and system debug, to name a few.

To round-out the package, Datatron complements Tempo 76 with a full line of compatible peripherals, including SMPTE code readers and generators, character generators, SMPTE jam-sync generators, routing switchers, and coincidence comparators.

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RLX - a receive end at your studio . . . or each station in your network \$895.

2F - a studio unit which can be operated in either the transmit or receive mode. \$2600.

# The Sports-Minded Low Frequency Extenders From Comrex

We introduced our full LX line in Las Vegas . . . to a very enthusiastic audience. More than once we heard: "If I hadn't dialed it myself, I wouldn't have believed it!"

One of the nicest reactions to the LX comes from Norm Woodruff, News Planning Consultant, in his radio newsletter "Keeping Current":

"To me, the *still* newest and best gadget going is a frequency expander for use on dial-up telephone lines. It was introduced a few months ago, and now has been placed in

some new configurations that make it even more attractive. . . . It can be used on two-way systems to improve quality. I mentioned this item when it was first out, and mention it again because it is still the newest piece of equipment that can do miraculous things to help out remote quality. As the networks start bringing full-fidelity broadcasts to your studio from the other side of the country, the audience is going to find it unpleasant to hear a local news event or ball game with the poor quality we have been allowing. This gadget solves the problem."

## COMREX

60 Union Avenue, P.O. Box 269, Sudbury, Massachusetts 01776  
617-443-5077

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# INTERPRETING THE **FCC** RULES & REGULATIONS

## Election '78: Sponsorship IDs And Candidate Authorization Notices

By Frederick W. Ford and Lee G. Lovett;  
Pittman, Lovett, Ford and Hennessey, Washington, D.C.

THE NOVEMBER 1978 ELECTIONS are fast approaching. Broadcast stations are subject to a substantial number of federal laws, Federal Communications Commission rules, and Federal Election Commission rules with respect to political broadcasts by certain candidates up for election.

Many broadcasters throw up their hands at the thought of having to become experts in the labyrinth of laws and regulations concerning sponsorship identification and candidate authorization during the election season.

In a move that may bring joy to the hearts of broadcasters beleaguered by excessive regulation, the Federal Communications Commission (FCC) and the Federal Election Commission (FEC) have recently issued a Joint Public Notice to set forth examples of sponsorship identification and candidate authorization notices that will comply with *both* the FCC's and the FEC's rules.

It should be noted that *the FCC's rules apply specifically to broadcast station licensees*, and not to candidates for public office, their committees, or other persons purchasing political broadcast time. On the other hand, *the FEC's rules apply to candidates for political office, their committees and other persons purchasing political broadcast time*, but not specifically to broadcast licensees.

Hence, while the sample sponsorship identification announcements and candidates' authorization notices contained in the Joint Public Notice satisfy the FCC's rules and the FEC's rules, it is up to the individual station licensee and political candidate, committee or other persons purchasing political broadcast time, to come to an agreement among themselves to use one of the suggested announcements.

### The FCC requirements

The basic proposition of the FCC's rules in the area of political candidate announcements is clear: a broadcast licensee has *no power of censorship* over "uses" of a

broadcast station by a legally qualified candidate for public office.<sup>1</sup> The definition of a "use" is any appearance by a political candidate during which the candidate is identified or is identifiable to the listening or viewing audience. This includes identification orally or, in the case of television, orally or visually.

In light of this proscription, the general rule *prohibits* the licensee from *requiring* a political broadcast (in which a candidate appears) to comply with the FEC rules concerning candidates' authorization notices. (Nonetheless, the candidate remains subject to any penalty that may accrue because of violation of the FEC rules; the broadcaster, however, is not liable.) There is an exception to this "no censorship" provision. A broadcaster may require that the political broadcast announcement comply with applicable FCC rules.

In general, the FCC rules require that any broadcast time "which is paid for or sponsored by a particular person or group must be accompanied by an announcement to that effect."<sup>2</sup> The rationale is obvious; listeners or viewers have to be fully informed of the identity of the person or group sponsoring and/or funding political announcements touting a particular political candidate.

There are additional FCC requirements. Whenever a station broadcasts a political announcement or program which has been furnished to the station "as an inducement for broadcast," the political announcement or program must contain a clear announcement that it was furnished to the station, by a particular individual, political committee or other organization.

The required announcement in these two situations may be audio or in readable print at the beginning or at the end of the furnished broadcast program or announcement. Whenever one of these announcements exceeds five minutes in length, the identifying announcement must be contained at the beginning *and* at the end.

### The FEC requirements

Federal law<sup>3</sup> and the FEC rules require that any "broadcast communication" which advocates the election or defeat of a "clearly identified" candidate must

<sup>1</sup> Communications Act of 1934, as amended, 47 U.S.C. §315.

<sup>2</sup> §73.1212 of the Commission's rules.

<sup>3</sup> The Federal Election Campaign Act, as amended, 2 U.S.C. §441 (d).

continued on page 90





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Call or write for full specifications and pricing.

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## FCC Rules and Regulations

contain an announcement that the broadcast was authorized, or was not authorized, by a particular candidate. This announcement must give "actual notice" to the radio listener or television viewer. In other words, the announcement must be plain on its face and not subject to misinterpretation.

The onus of complying with the federal law and the FEC's rules falls upon the candidate, his political committee, or upon the individual or organization providing the political announcement or program. This is unlike the FCC rules, which place the onus of compliance on the broadcaster.

### Notices and announcements which comply with both the FCC and FEC regulations

A broadcast station will be "safe" if it can come to clear agreement with candidates, political committees, and other individuals or organizations that provide political broadcast announcements and programs.

The authorization notices and sponsor identification announcements which comply with the FCC and FEC rules fall within three categories:

**Category 1:** "Broadcast communication which is authorized by and financed (or furnished) by the candidate or by the candidate's authorized committee." The key here is that the broadcast is *both authorized by and financed* (or furnished) by the candidate or his committee. Permissible announcements include the following:

- (1) "Paid for by [name of candidate or committee]."

- (2) "Paid for and authorized by [name of candidate or committee]."
- (3) "Sponsored by [name of candidate or committee]."
- (4) "Furnished by [name of candidate or committee]."

Keep in mind that authorization by a candidate is assumed whenever a candidate or committee pays for or furnishes a broadcast communication. In such an instance, a specific announcement does not have to be made. In other words, the average viewer would consider that Candidate X paid for his own political announcement, unless the viewer is told otherwise.

**Category 2:** "Broadcast communication which is authorized by the candidate or the candidate's authorized committee, but financed (or furnished) by a third party." The only difference between this category and Category 1, above, is that some third party finances or furnishes the broadcast communication in question. Permissible announcements follow.

- (1) "Paid for by [name of third party] and authorized by [name of candidate]."
- (2) "Sponsored by [name of third party] and authorized by [name of candidate]."
- (3) "Furnished by [name of third party] and authorized by [name of candidate or committee]."

**Category 3:** "Broadcast communication which is financed by a third party and not authorized by any candidate or any candidate's authorized committee." This third category is distinguishable from the first two categories in that there is no *apparent* connection between the candidate and the person furnishing the broadcast announcements. Permissible announcements include the following:

- (1) "Paid for by [name of sponsor/payor] and not authorized by any candidate."
- (2) "Sponsored by [name of sponsor/payor] and not authorized by any candidate."
- (3) "Sponsored by [name of person or group furnishing broadcast] but not authorized by any candidate."

### Special announcement requirement

Sometimes an additional announcement must be included with the broadcast of political matter. Whenever a broadcast communication solicits political contributions from the viewers or listeners or is financed by a political committee, the following announcement must be included:

"A copy of our report is filed with the Federal Election Commission and is available for purchase from the Federal Election Commission, Washington, D.C."

### State statutes preempted

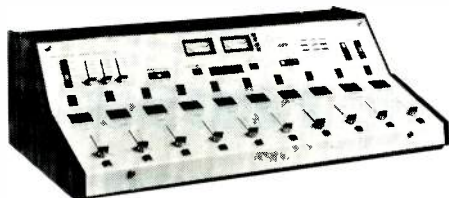
The FEC notice requirements discussed above completely *preempt* and *supercede* state statutes which impose additional notice requirements on political advertising by federal office candidates.

### Conclusion

The FCC and FEC Joint Public Notice should make compliance with sponsorship identification and candidate authorization notices quite a bit easier for broadcasters. Station personnel with responsibility for political programming and announcements should become thoroughly familiar with the FCC and FEC rules as well as with the Joint Public Notice. Copies are available from the FCC and FEC.

BM/E

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For production studio use to insert the standard 25 Hz automation actuating tone. Starts tape transport and actuates muting to eliminate bias pops and other start-up noises. Tone button applies 25 Hz tone and stops transport at end of tone.



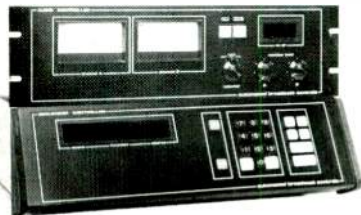
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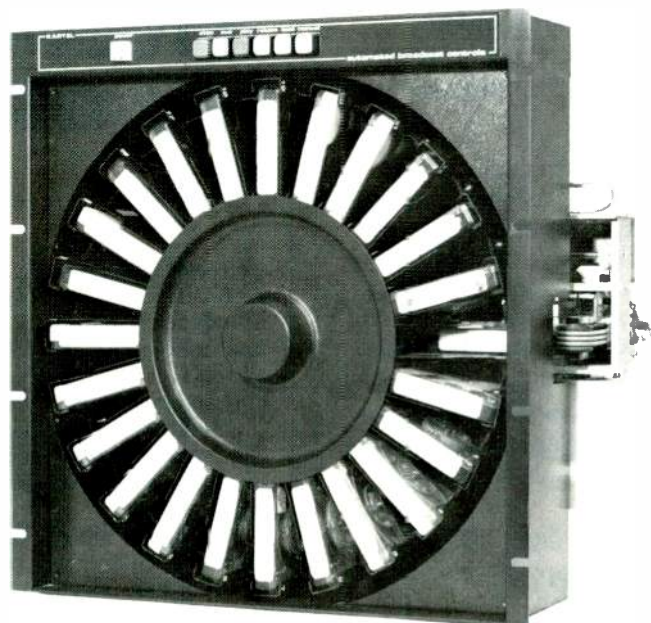


## 1200 C TIME PROGRAM CONTROLLER

Provides 10 programmable exact time points per hour for real time control of 2800AS and 2800 APM plus digital clock display. 8 relay function outputs for time announcements, transmitter on/off control and other functions. Crystal time base and battery backup.

## RMD REMOTE CONTROLLER

Provides full entry remote control for traffic department or control room access to automation system. Allows complete programming with display of next-to-run or program-entry.



Automated Broadcast Controls provides the total modular approach to AM, FM and Short Wave program automation. Our individual modules may be used alone, assembled into complete automation systems, or used with existing equipment to update and expand automatic programming. All Automated Broadcast Controls equipment is manufactured to the highest standards for excellent reliability and easy maintenance. Easily obtained solid state devices are used with printed circuit construction, socket mounted integrated circuits and quick disconnect interface connectors. All equipment is covered by a one year full warranty.

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The 2800 family of audio controllers is perfect for your new automation system, or for use with present audio sources. Features 2000 pre-programmed events (expandable to 8000) 12 audio sources (expandable to 96), full random select for 9 multiple cartridge players. Accessories include remote control, logging and computer interfaces.



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## \* U-Matic Users...

### Call us before the FCC Calls you.

We're speaking of the potential FCC claim that your broadcast signal is illegal.

Meaning, when your vertical blanking is off a line and a half, which is fairly commonplace, you could be in trouble. The problem is created when your VTR runs into a non-framed edit. Your TBC then has no choice but to play around a bit.

Cezar International has solved this silly problem for less than \$500.00, it's called the "Infielder".

Our new "Infielder" board bridges the gap. Off-line, it eliminates *the whip at the top of the picture*; it simply takes care of non-framed edits once and for all.

Also, a word about our service manual. You *could* build your own solution... it's that complete. Send \$495 for the manual and get an "Infielder" FREE. A neat package.

Not a bad offer. Right?

Want to solve your problem? Call one of our favorite distributors. They should be able to help.

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Northern Video	Video Systems Network

### Cezar International, LTD.

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Sunnyvale, CA 94087  
(408) 733-1436

\*U-Matic T.M. Sony Corporation

## The Communications Act of 1978 Proposed on Capitol Hill

CONGRESSMAN LIONEL VAN DEERLIN (D-Calif.) and Lou Frey (R-Fla.) have introduced HR 13015 — The Communications Act of 1978. The long-awaited bill has already generated support and controversy within the broadcast industry, with radio in favor of its call for deregulation, and television taking a more cautious view of the Act's implications.

Among the bill's more dramatic features is a call for near-complete deregulation of radio, a takeover of cable TV regulation by the states, modifications of television regulation policy, and the abolishment of the FCC. The bill calls for the FCC to be replaced with a Communications Regulatory Commission (CRC) to determine and enforce technical standards. License fees reflecting the cost of processing license applications and the value of the spectrum space would establish the Telecommunications Fund. This fund would support the CRC, public broadcast programming, minority ownership of stations, and the development of telecommunications services in rural areas.

Currently, the number of stations a single entity may own is 21 (seven TVs, seven AMs, and seven FMs). Under the new legislation, five TVs, no more than three of which could be in the top 50 markets, and a total of five radio stations would be the limit. Ownership would also be restricted to only one station of any kind per market. Although present owners would be exempt from the new limits, their position would not be protected if they lost or traded off any of their stations. The bill provides that new station licenses, and existing ones that become available, would be allocated to qualified applicants under a system of random selection.

NRBA president Jim Gabbert has praised the House Communications Subcommittee for clearly recognizing that radio and television are distinctly different. The bill implies that radio licensees will no longer be subject to format restrictions, commercial limita-

tions, ascertainment requirements, fairness doctrine and equal time provisions, contest and promotion restrictions, news and public affairs percentages, or the maintenance of logs. Gabbert said that it is now time for radio broadcasters to join together to support the concept of deregulation of radio.

Under the bill, licenses would be given to radio for indefinite terms, and they would be subject to revocation only for technical violations. Van Deerlin said that the deregulation of radio is justified on the grounds that the number of radio stations in the U.S. is now equal to the number of weekly newspapers and that the scarcity element, which existed when the 1934 act was written, no longer applies.

Such is not the case with television. According to Van Deerlin, the scarcity factor still exists, and for that reason, the bill retains a limit on the term of TV licenses, but extends it from the current three years to five, with a provision that after ten years, TV licenses would also be awarded for indefinite terms.

Like radio, television would be released from ascertainment, but it would still be required to carry news, public affairs, and locally produced programming. TV would also be subject to an "equity principle," which essentially is a fairness doctrine without the required effort to cover controversial topics of public importance. If a TV station did give coverage to a controversy, it would have to do so in an equitable manner. The proposal also exempts television from providing equal time for federal and statewide candidates.

In an analysis of the rewrite, the NAB has found fault. Although the NAB would like to see the equal time and fairness doctrines dropped, it notes that the language of the new ruling might lead to the establishment of minimum percentages of news, public affairs, and locally produced programming, and may be intended to get at blocks of network programming such as prime time, which would mean greater interference by government in

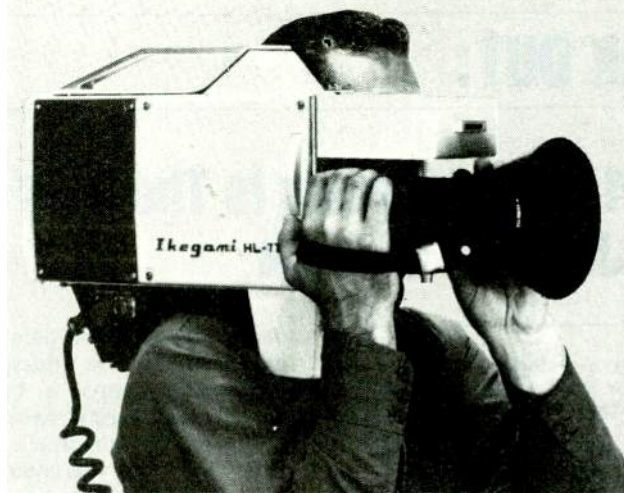
the scheduling and programming decisions of television stations. NAB is also critical of the language regarding spectrum assignment to serve "communities" instead of "all" the people of the U.S. It is thought that such assignment may lead to low-powered radio stations and short-spaced drop-ins for TV. Also, a call for efficient assignment might lead to preference of land mobile over UHF. Regarding the deregulation of cable, the NAB notes that such an action will offer no prevention of program siphoning by pay cable.

NAB's analysis is not a formal stance. The joint board will evaluate the rewrite and decide on an official association stand.

NCTA president Robert L. Schmidt applauded the efforts to develop a consumer-oriented Communications Act. Schmidt stated, "If total federal deregulation, as proposed in the bill, allows cable systems to offer new signals and services in each marketplace, the viewer will benefit. However, to assure that regulations dismantled on the federal level would not be reassembled on the state level, some Congressional guidance may be necessary. The public deserves a guarantee at the national level of the broadest possible variety of communications services." Schmidt cautioned, however, that the bill's common carrier provisions must be carefully scrutinized, as they "appear to open the door for the world's largest and most profitable monopoly, the telephone company, to expand into virtually all areas of communications including cable television." Schmidt also commented that the association was looking forward to hearings where the need for these modifications can be explored.

It is not surprising that the rewrite has been met, thus far, with praise as well as criticism. There is even disagreement between the primary drafters. Van Deerlin proposes that license fees provide revenue for funding of the CRC, public broadcasting programming, loans to stimulate minority ownership in broadcasting, and the expansion of rural telecommunications; Frey, on the other hand, sees the fees as a way to pay the commission's bills, and if there is any money left over, then, "fine," it could be spent on the other programs.

Given the sweeping impact the passage of such a bill will have on the communications industry, broadcasters, common carriers, and other interest groups can be expected to start taking up sides. Lobbying on the Hill, both for and against, is likely to be intense. Now that the bill has been drafted, all parties are urging their memberships to become familiar with the content of the bill and to make their reactions known to Congress. **BME**



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## SPEAK OUT:

# "4-4-4 Broadcasting Is The Only Imperfect Game In Town," Says John M. Woram

*John Woram, president of Woram Associates, New York, audio and recording consultants, has been active in consulting work for JVC and Panasonic on behalf of quadraphonic broadcasting. He is editor of db Magazine and a free-lance recording engineer with many commercial records to his credit, the author of the "SQ Handbook for Recording Engineers" and more recently of "The Recording Studio Handbook." Woram is a Fellow of the Audio Engineering Society and former vice president of the Eastern Region of the AES.*

IF ONE KEEPS TRACK of all the nonsense written in favor of this or that quad broadcasting system, the following conclusion seems inescapable: "Recent scientific investigation demonstrates that, of all the contending systems, each one has just been proven superior to all the others. While further improvements are inconceivable, they will be announced shortly."

Well, with all these perfect systems now available to the broadcaster, I thought it would be fun to speak out on the subject of imperfection. Like four-channel tape recorders and, yes, even 4-4-4 broadcasting. The problem with four-channel tape recorders is that tapes produced upon them cannot be broadcast over any existing FM stereo system. That shouldn't come as too much of a shock, since most broadcasters have already figured out that today's FM stereo is a two-channel medium. Recalling high school physics, they probably also recall a little saying that goes, "Two things cannot occupy the same space at the same time." Going a bit farther, it follows that four things cannot occupy two spaces at the same time, although I don't think any physicist has said as much. Probably because it shouldn't need saying.

Of course, there's an exception, which I shall call "Abe Lincoln's amendment to the Laws of Physics." It says, "You may fool all the people some of the time; you can even fool some of the people all the time; but you can't fool all the people all the time." Historians are not certain whether honest Abe was anticipating quad broadcasting or not, but it really

doesn't matter. The point is, you can indeed create the illusion that four channels occupy a two channel medium (thereby fooling all the people some of the time).

Obviously, if you could do it all the time, there would be no need for four channel tape recorders. Two channels would be sufficient. And in the recording studio, eight-track machines could be replaced by fours, 16s by eights, and so on. Just think of the savings! But don't think about doing it, because it doesn't work.

Well then, just how does one transmit quadraphonic programs? Most mathematicians have the notion that in order to solve a problem involving four unknowns, it is necessary to have four equations. If you have less than four, it may be possible — depending on the circumstances — to solve almost all of the problem (some of the time). Well, quad programs have (or should have) four independent channels. Therefore, we need four equations (that is, four transmission channels). Enough said?

What then is all the furor about? Much to the surprise of no one at all, the FCC's recent "Subjective Evaluation of FM Quadraphonic Reproduction Systems" noted that, "... from an overall consideration of the rankings, the discrete 4-4-4 system was the majority choice." Then, perhaps in a lapse of good engineering judgment, the report editorialized that, "... although superior in aural performance, the 4-4-4 system might be precluded from adoption for FM broadcast services because of other technical and/or economic factors."

Needless to say, opponents of discrete quad broadcasting are having a field day with this, treating the statement as though it represented a major technological breakthrough in the Commission's laboratories. By now, we have been harangued by every conceivable (and some inconceivable) reason why broadcasters should be forbidden to broadcast 4-4-4, even if they would like to try to do so.

I'll spare *BM/E* readers, as well as myself, the agony of reciting all the arguments against 4-4-4. For the moment, I'll go so far as to imagine that

even the more spectacularly asinine anti-discrete statements are true, and that one or another of the various contending 4-2-4 systems is — by some triumph of mathematical logic — the equal of the original four-channel tape. This leaves us with a fascinating new truth (perhaps the dawn of a new science) in which a 4-4-4 system is unsatisfactory, while at the same time, when we encode a four-channel program into two channels and later decode it back up again to four, we have a program that is preferred over the original. Truly, a miracle of space-age technology. If you're having trouble following this line of logic, please don't call me. I can't figure it out either.

Well, now that we've proven that 4-4-4 is a menace, why not let those foolish broadcasters who would like to try it have a crack at it? Obviously, they'll quickly destroy themselves, and we can all move on to better things. But the very thought strikes terror in the hearts of some. "No, NO!" they cry; "the FCC must protect the American public from this!"

Why? Will 4-4-4 pollute our rivers? Maybe it's carcinogenic? Does it promote violence in the streets? Will it overthrow the government? Or will it simply beat the pants off the other systems if the FCC doesn't "protect" us from it?

FM broadcasters with an eye on the future should think this over very carefully. Or, they can postpone thinking about it until AM stereo has fully matured. Then what?

Like the four-channel tape recorder, and audio in general, the 4-4-4 broadcast system is not perfect. It probably never will be. But it does leave the door open to future developments in technology, for those who want it. For those who don't, 4-4-4 need not interfere with their present operation. Why, if all we read is really true, it might even help thin out the competition.

Then again, it might not. So, why not let us try it? As Richard Dean put it in this column back in January, that's free enterprise. It's nothing to be afraid of. Unless you have something to lose.

**BM/E**

# NRBA '78

## The Scene: San Francisco The Subject: Radio Engineering The Action: Intense

From two exhibit halls jammed with the latest in equipment and services, to meeting rooms where pros trade outlooks, insights and arguments, to busy hospitality suites and impromptu corridor conferences, the subject is radio and only radio. And the involvement is intense.

It's NRBA's Annual National Radio Broadcasters Conference and Exposition, and it's coming up in San Francisco September 17-20.

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With the emphasis in small give-and-take workshops on new methods, new concepts and new technology, you'll gather information, inspiration and ideas that will pay off for you right away whether your station is big or small, AM or FM, urban or rural.

Windy speeches, wordy presentations and mutual admiration ceremonies are out; no-nonsense results-oriented working sessions are in.

### Enjoy San Francisco, too.

NRBA convention headquarters in the spectacular Hyatt Regency Hotel in San Francisco's Embarcadero Center is the perfect jumping-off point for visits to the attractions of one of America's favorite cities.

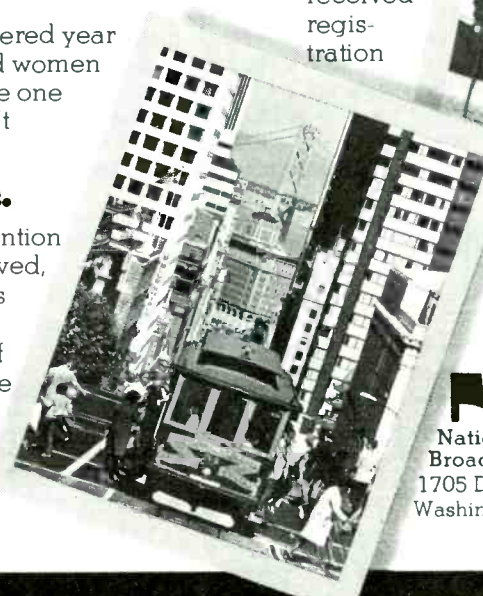
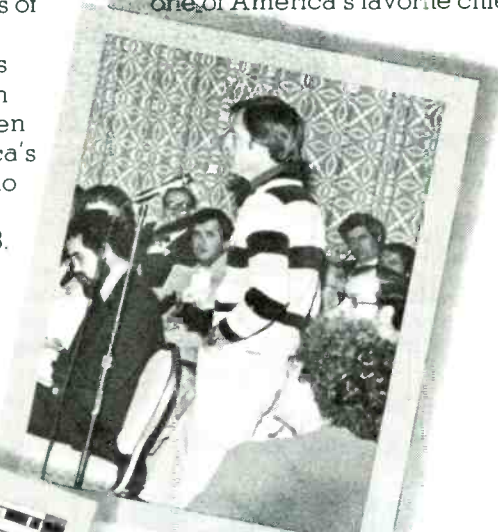
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# GREAT IDEA CONTEST

## 47. Power Supply For ENG Operation When 110 Volts AC Is Available.

*Bill Cheb, Engineering Supervisor, Audiovisual Media Centre, University of Alberta, Edmonton, Canada.*

**Problem:** To be able to use our Ampex BCC-4 ENG camera (in a single camera operation) in areas where 110 volts AC is readily available without resorting to using the battery belt or the expensive AC/remote sync adapter offered as an accessory.

**Solution:** Build a small regulated DC power supply for use with the camera. The DC power requirements for the camera are  $\pm 9V$  at approximately two ADC per side.

The power supply itself consists of two regulated supplies, one for +12V and one for -12V. The DC input voltage requirements for the camera are not critical and the camera can safely accept an input voltage range from  $\pm 10V$  to  $\pm 16V$ . (The camera itself has  $\pm 9V$  regulators.)  $\pm 12V$  was chosen to allow for any voltage drop in a long power cord (say 100 feet) not to affect the proper operation of the regulators in

the camera. Each side of the power supply is completely separate, with a power transformer (rated for 12.6 VRMS @ 3A secondary), a bridge rectifier (rated @ 4A), an input filter capacitor (rated at  $10,000\mu F @ 25V$ ), and a National Semiconductor three terminal regulator with associated components (see schematic). A yellow LED was used for each side of the supply to indicate the presence of the  $\pm 9V$ . (Yellow was used because of the eye's greater sensitivity in the yellow-green region and thus the LEDs can be seen easier at a greater distance under high ambient light conditions than with red LEDs.) The output connector is a Switchcraft D6M with pin one supplying the +12V, pin six supplying -12V and pins three and four for ground.

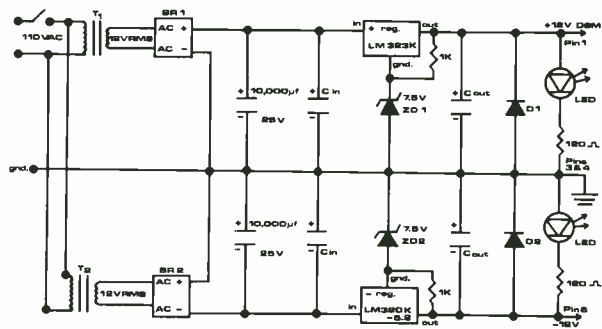
We made a 100 foot power cord for interconnecting the camera and power supply. The cord is an 18/3 cabytre with a Switchcraft A6M (six pin male) on one end and a Switchcraft A6F (six pin female) on the other end. Any difficulty in pushing the cord through the rubber strain reliefs on the connectors can be overcome by using silicone grease (heat sink compound) on the cord. The power supply cord can also be used as an extension cord for the battery belt.

**Construction Considerations:** C in should be  $2.2\mu F$  solid tantalum capacitors. C out should be one  $\mu F$  solid tantalum capacitors. Both C in and C out should be physically as close as possible to the three terminal regulators.

C in is to ensure stable operation of the regulators and C out improves the transient response of the regulators.

D1 and D2 are protective diodes and they allow the regulators to start under common load. They should be rated at the regulator short circuit current. They should also be placed as close as possible to the regulators.

The regulators should be well heat sunk. This allows the regulators to provide output currents up to 100 percent



*Bill Cheb's schematic for regulated DC power supply from 110 AC*



in excess of their rated output without thermal shut down.

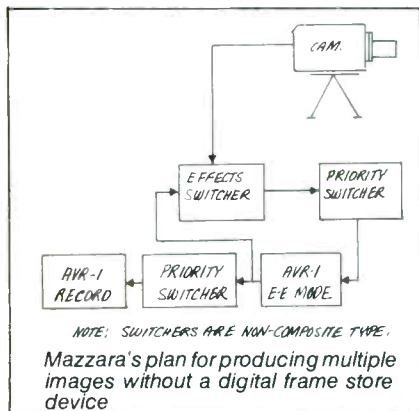
The two regulators are normally rated to provide five volts out. By biasing the ground terminal of the regulators 7.5V away from ground via Z.D. one and two, the effective output voltage (referenced to chassis ground) becomes the rated voltage (5V), plus the voltage on the regulator ground terminal (in this case 7.5V). Thus we achieve our  $\pm 12$  volts out.

#### 46. Multiple Images Without a Frame Store Device.

S. Mazzara, TV Engineer, United Nations TV (RMGAB), New York, N.Y.

**Problem:** Producing multiple images without the use of a digital frame store device.

**Solution:** The desired effect was achieved as follows. A camera was keyed over the output of an AVR-1 tape machine. The output of the effects



switcher was fed into the input of the above tape machine. This set up an oscillating condition in the machine. The AVR-1 has a test feature which provides a continuously variable delay of  $64\mu s$  (video position on buffer test switch). By varying the delay (delay control), the uncontrolled oscillating of the tape machine now becomes a source of multiple images. The number of images changes with the amount of delay. The output of this tape machine is then recorded (we used another AVR-1), with particular attention paid to the levels (video and setup).

The final effect was that of a dancer appearing in multiple images of different color. By moving her in the camera frame, only portions of her body were visible, or she disappeared completely. As an example of the effect, the opening consisted of four vertical bars of different color. The dancer then pointed her leg perpendicularly to her body.

continued on page 98

# There are few things in life designed like a Scully

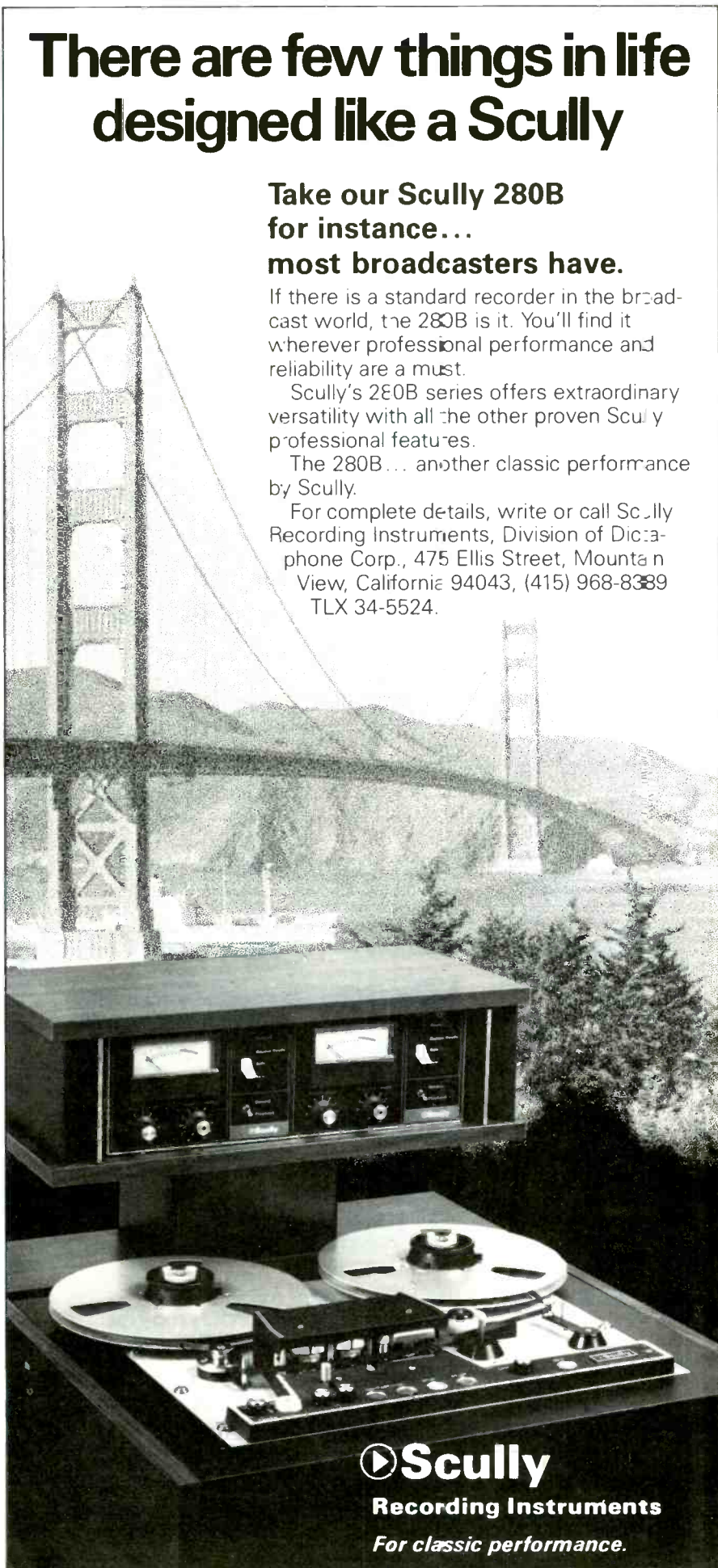
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## Great Ideas

This appeared as four feet emerging from behind four curtains. Further description defies explanation, but we intend to do continuing experimentation with this effect.

### 48. Getting Enough Voltage To The Power Output Meter.

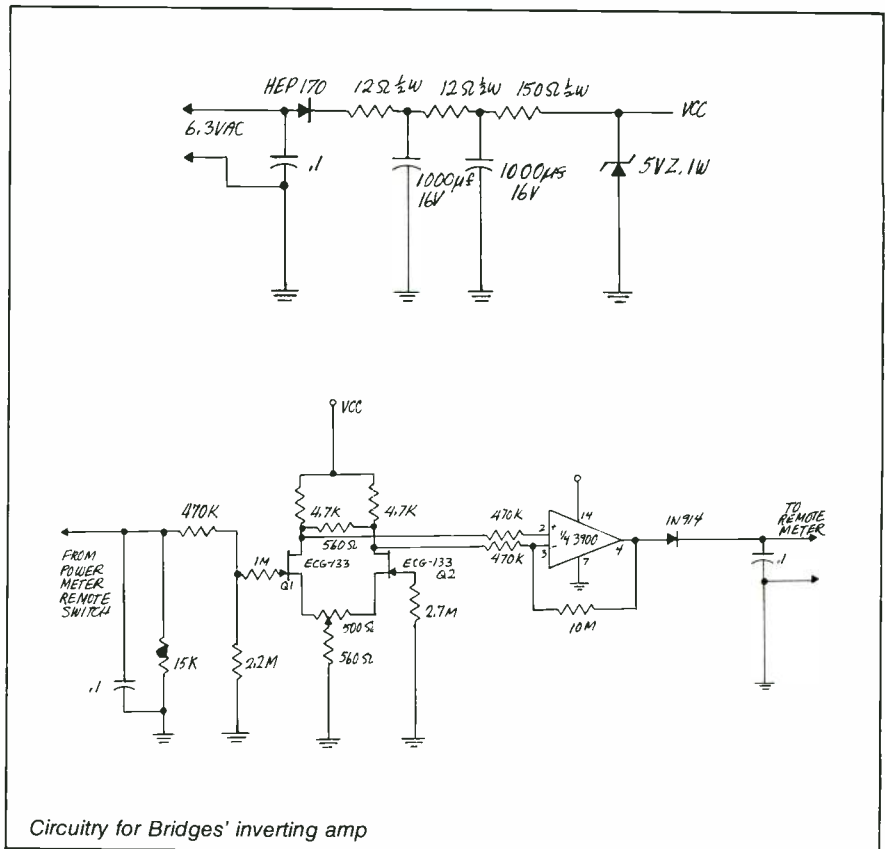
Steve Bridges, Chief Engineer, KYKX, Longview, TX

**Problem:** When we moved to our new studio down town and remoted everything on the "Hill." The standby transmitter would not produce enough voltage to drive the power output meter to 100%.

**Solution:** The circuit shown is an inverting amp with 0 voltage out for 0 voltage in. The circuit senses a negative voltage from the transmitter directional coupler and produces a positive sample. The input does not load the meter circuit. Q1, Q2 provide balanced currents for the op-amp with no voltage applied. The LM3900 is used because it required only one power supply and ground references the output voltage.

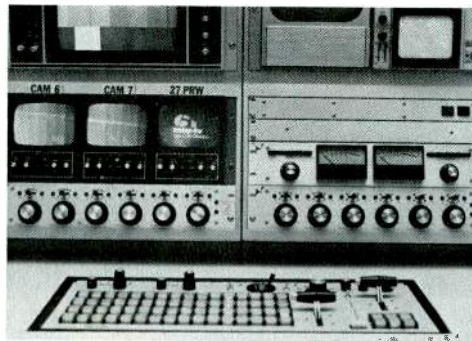
The circuit produces 3.5 V out for an 0.8 input and should drive any remote

meter loop. Be sure to shield the circuit and use all passing shown.



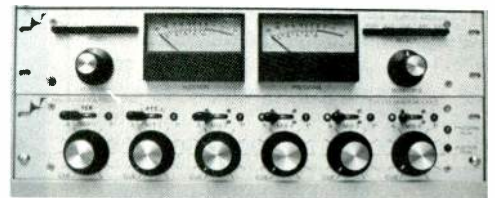
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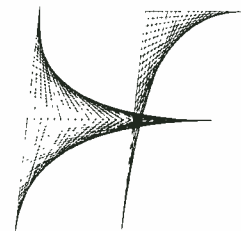


The TVA142 mixer module has six inputs. Each of these inputs may be mic or line level (designation must be made at time of installation). In the AFV mode, the video switcher, through ground switching, activates a noiseless control sending audio to program or audition (or both). Light-emitting diodes indicate the status of each channel, and manual override is easily accomplished with a lever switch above each channel gain control.

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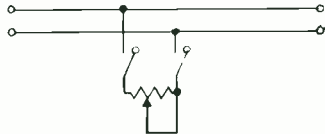


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**Correction for Great Idea 5,** "Simple Device for Matching Impedance," submitted by David C. Williams, Director of Engineering, KGMS/KSFM, Sacramento, California.



Above is the correct version of the drawing which shows Williams's 10 K ohm 10 turn pot. The error in the drawing accompanying the original printing of the Great Idea was *BM/E's* and not Mr. Williams's.

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Objective or Problem: (in few words; use separate sheet for details) \_\_\_\_\_

Solution: (Use separate sheet—500 words max)

I assert that, to the best of my knowledge, the idea submitted is original with this station; and I hereby give BM/E permission to publish the material.

Signed \_\_\_\_\_ Date \_\_\_\_\_

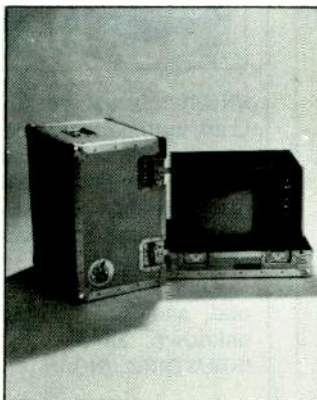
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# BROADCAST EQUIPMENT

## Impedance Meter 250

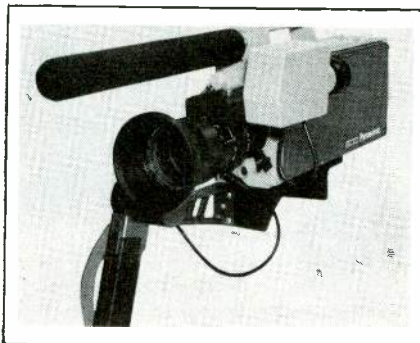
The 253 autoranging digital impedance meter is designed to measure an unknown and to automatically select the lowest corresponding range, providing maximum resolution. Manual range



selection is also possible. L, R, C, and G are automatically measured to a basic accuracy of .25 percent by this seven-pound, benchtop tester. Capacitance range extends to 2000 $\mu$ F, inductance to 200H, and resistance to two megaohms. Features include one kHz test frequency, four measurements per second, and four terminal connection to unknown. \$845. ELECTRO SCIENTIFIC INDUSTRIES, INC.

## ENG Camera 251

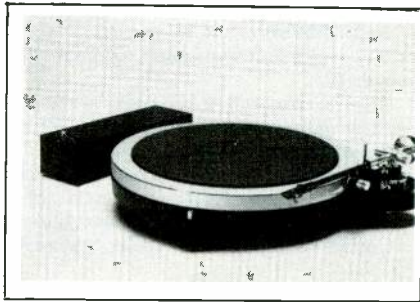
Model AK-750 is self contained, and is designed as a three-tube camera giving



the user the option to select from a number of  $\frac{2}{3}$ -inch tubes. It features black and analog memory, auto white balance circuit, three-way power supply with AC adapter for battery pack, and built-in bias light. Resolution is 500 lines center, and SNR is better than 46dB. The camera has optional 4.5-inch viewfinder and remote control for studio system application. Other features include high gain SW, 1.5-inch viewfinder, four position filter disc for color conversion, and more. PANASONIC.

## Turntable 267

The DQX-500 is a direct drive, quartz-locked manual unit. It features a separate power supply, quartz control, and tone arm dust cover. This two-speed model has a die-cast 5.75 pound



aluminum platter. Specs include wow and flutter of less than .02 percent and SNR better than 62dB. Also featured is the MA-707 tone arm which utilizes a torsion bar system to achieve balance, and a unique counterweight system to adjust the resonant frequency of the arm/cartridge combination. \$500. TEAC CORP. OF AMERICA.

## Power Amplifier 268

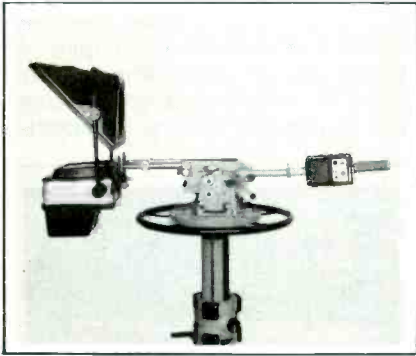
Model 701 is a heavily constructed DC unit offering 80 watts continuous power

output. Other specs include frequency response within  $\pm 0.1$  dB; DC to 20 kHz into eight ohms at full output, and within  $\pm 0.3$  dB, DC to 20 kHz, into four ohms; THD less than .02 percent; DC to 20 kHz at full output; and SNR better than 100dB below full output. \$89. SPECTRA SONICS.

### Prompting System

252

The Digivision on-camera prompter features an externally mounted power transformer which eliminates the need for counterweights, camera supports, or special rigs. Also featured is a quick release mount (to Vinten heads) inde-

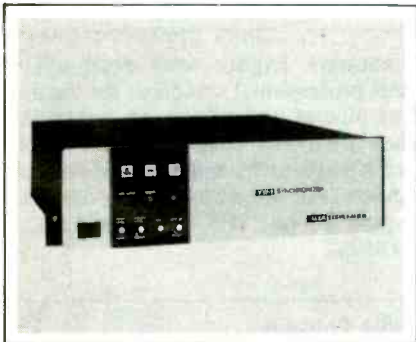


pendent of camera. A weight of 22 pounds includes the monitor, hood, and mirror assembly. The 702 Script drive has an internal video DA for multiple monitors, and features self-aligning caterpillar drive for various widths and thicknesses of scripts. Also featured is a remote stop/start pedal. The system uses a  $\frac{3}{8}$ -inch vidicon camera and three independently choked lamps. Twelve and 17 inch prompters are \$1800 and \$2,000. Drive unit, \$3,000. LISTEC TELEVISION EQUIPMENT.

### Frame Synchronizer

253

The VW-1 full-frame synchronizer is a fourth harmonic, digital synchronizer

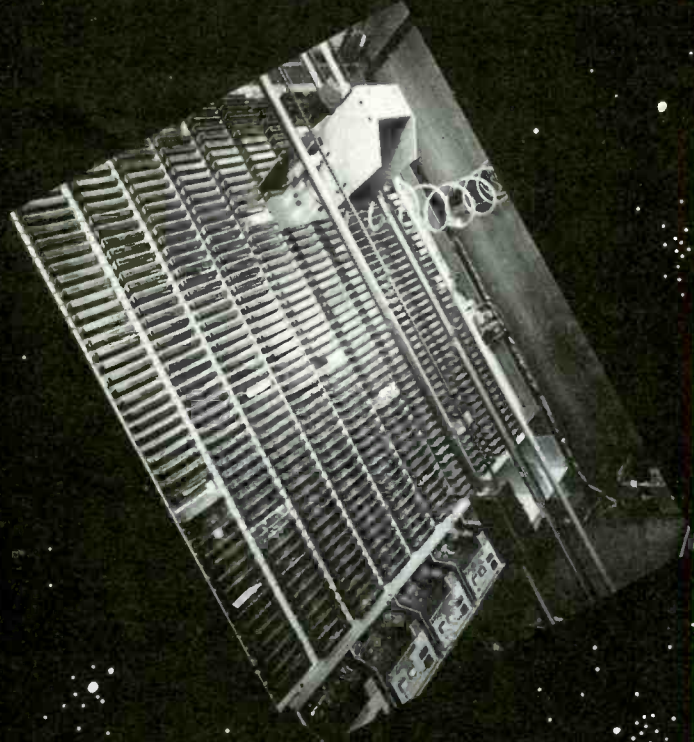


designed to lock remote, network, ENG, and satellite feeds to station reference. The unit also functions as a  
continued on page 102

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RM-102 transmitter and receiver.

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## Broadcast Equipment

For more information circle bold face numbers on reader service card

TBC for heterodyne color U-matic recorder formats. The system will accept any NTSC-type standard, and comes with optional freeze frame. Under \$20,000. ADDA CORPORATION.

### Preamplifier

254

Model 5152 is designed to provide flat, wideband response with low noise and distortion. It features two input channels, mic, line, and phono input capability, less than 0.2 percent THD, and balanced or unbalanced output. An override facility can be remotely controlled for voiceover announcements. Each channel accepts an unbalanced,



high impedance mic, or line input. Balanced low impedance mics or lines may be input with the use of an optional plug-in transformer. Channel two is switchable to RIAA phono equalization, and is provided with two phono jacks (in parallel) to obtain a mono signal from stereo mag cartridges. Output is single channel, and a transformer supplies balanced low impedance line drive with 24dBm; direct output supplies 18dBm unbalanced. JBL.

### Fresnels

255

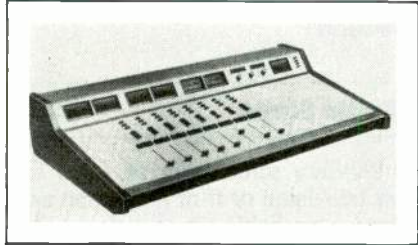
Greatmark Lights were designed to meet professional standards for the motion picture and television industries. They are available in five kW 14-inch, two kW 10-inch, and one kW six-inch models. All are designed for use with bi-post lamps. THE GREAT AMERICAN MARKET.

### Audio Console

256

The Beaucart consoles are eight to 16 channel stereo units with top plug-in channel modules (with gold-on-gold

connectors). Each module has three selectable inputs allowing a maximum of 48 hard wire inputs. Module cards include a high-low switch for impedance matching and a  $\pm 10\text{dB}$  trim switch. The console incorporates three fully metered matching stereo busses out, and a fully metered mono feed bus. Four program sources can be fed simultaneously from these busses. Any

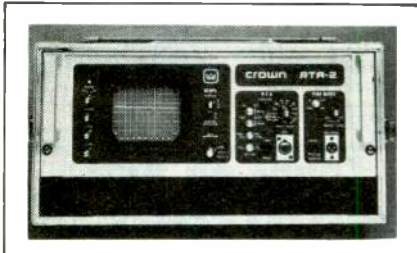


channel module is capable of feeding any program bus through the use of a series of four switches. In addition to cue detent at the bottom of each attenuator, a cue bus access button allows auditioning of upcoming material without disturbing pre-set volume levels. Other features include noiseless DC switching, remote start/stop for external equipment, and VU meters illuminated only when a channel is in use. Options include, crystal controlled real time count-up/count-down, and PPMs or VUs with PPM flashing LEDs. UMC ELECTRONICS.

### Audio Band Analyzer

257

The RTA-2 is designed for on-site equalization and analysis of sound reinforcement systems. Thirty-two filters provide a dynamic range for the unit of 60dB and a bandwidth of 16Hz to 20kHz. The unit has a built-in five-inch scope, and built-in pseudorandom pink noise generator. It also has front-panel, balanced and unbalanced line/mic outputs for pink noise, and balanced and



unbalanced line/mic inputs. Scope displays are switchable to full or  $\frac{1}{3}$  octave and can be set for 10dB or 5dB per division on the scope. Filter circuit integration time can be fast or slow (which averages the spectrum for measuring system response). Speed selection is separate for the 16Hz to 630Hz filters, and for the 800Hz to 20kHz filters. Rear panel gain controls are provided for each input, and front controls include input level control and

continued on page 104

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## Broadcast Equipment

40dB attenuation switch. Unit is configured for rack mounting. \$2595. CROWN INTERNATIONAL.

### Linear Amp 258

The CA2820 is a high output, wide bandwidth, hybrid amp that operates over the five to 500MHz range with a flatness of  $\pm 1.5$ dB. Typical power output is 400mW PEP, at a  $-32$ dB IMD. The unit is internally matched for 50 ohm impedance and has a third order intercept of 35dB minimum. Gain at 100MHz is 30dB. The CA2820 features gold metallization and diffused emitter ballasting. It operates from a 24V DC power supply. TRW.

### Multiplexing Filters 259

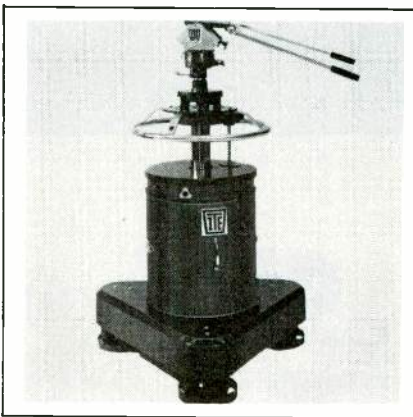
A new series of high-level frequency multiplexing filters handles two, three, and four channels. The MBD, MDT, and MDQ operate in the frequency range of 500 to 1000 MHz, and feature low insertion loss, 1dB maximum; high power capability, 100 watts per channel; and high isolation, 20 dB minimum. MU-DEL ELECTRONICS.

### Turntable Pre-amp 260

Model 6405 features self-contained power supply, compact size, and mounting brackets for either sidewall or panel mounting. Specs include .05 percent THD + IM, and noise at  $-73$  dBm, effective input noise  $-117$  dBm. \$200. MICRO-TRAK.

### Camera Pedestal 262

The ITE-P6 is a compact lightweight pedestal designed for the support of studio and ENG cameras weighing up



to 90 pounds. It utilizes constant torque spring assemblies for counterbalance, and features crab steering, and column elevation controlled by the steering wheel. Dual six-inch ball bearing wheels have polyurethane tires equipped with adjustable cable guards, and are gimbal-mounted. The pedestal will elevate from 33 to 52 inches, and has a doorway width of 28 inches. Weight is 150 pounds. INNOVATIVE TELEVISION EQUIPMENT.

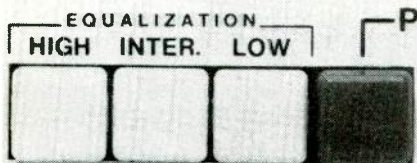
### Projection Screen 263

The Navilux screen can be used for either television or film projection and features a washable silver surface. The rounded lenticular surface allows for viewing at up to a 160 degree angle, and brilliance enough for daylight or "lights-on" use. The screen is constructed with a mounting yolk that is adjustable for tripod or table top viewing, or permanent installation. Sizes available are 40 by 40, 40 by 60, and 50 by 70 inches. \$169 to \$399. D.O. INDUSTRIES.

### Signal Generator 264

Model 3002 provides 0.001 percent

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frequency accuracy and 0.2 ppm/hour stability over the entire frequency range (one kHz to 520 MHz). Frequency programming is standard, and the unit is compatible with the IEEE 488-1975 General Purpose Interface Bus when



used with Wavetek's Model 3911 GPIB Converter. The instrument offers CW, AM, and FM operation with internal 400 and 1000 Hz, or external modulation capabilities. Options for the model 3002 include level programming, external frequency reference, reverse power protection, and low-level leakage. Base price, \$3300. WAVETEK.

**Automatic Frequency Counter 265**

The PM 6664-01 is lightweight (3.2 lbs.), compact (5.75 by 1.75 by 8.7 in.), easy to operate, accurate, and offers high frequency capability. It has an eight-digit LED display and features a range of automatic input sensitivity from 20 mV rms (100 Hz to 520 MHz) to 1 V rms. Input attenuation is automatic and continuously variable insuring accurate measurements. \$545.00. PHILIPS TEST AND MEASURING INSTRUMENTS INC.

**Pulse Generator 266**

Model 101C has a 20MHz rep rate, a fixed rise time of less than 10 nanoseconds, and provides an output vari-



able to  $\pm 18$  volts from 50 ohms (or 9 volts into 50 ohms). Simultaneous auxiliary front panel outputs are designed for TTL logic level 4 ns rise time; and CMOS, open collector output capable of 40 volt amplitude or 10 mA. Accessories are a code generator, powered by the 101C, which generates an arbitrary code up to 4096 bits long, and a burst generator for generating a presettable burst of pulses from 1 to 999. \$595.00. SYSTRON-DONNER.

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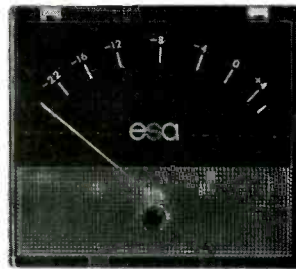
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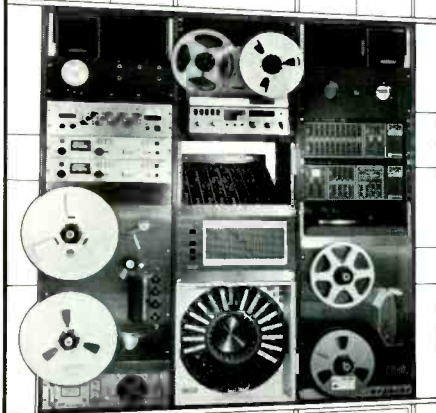
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